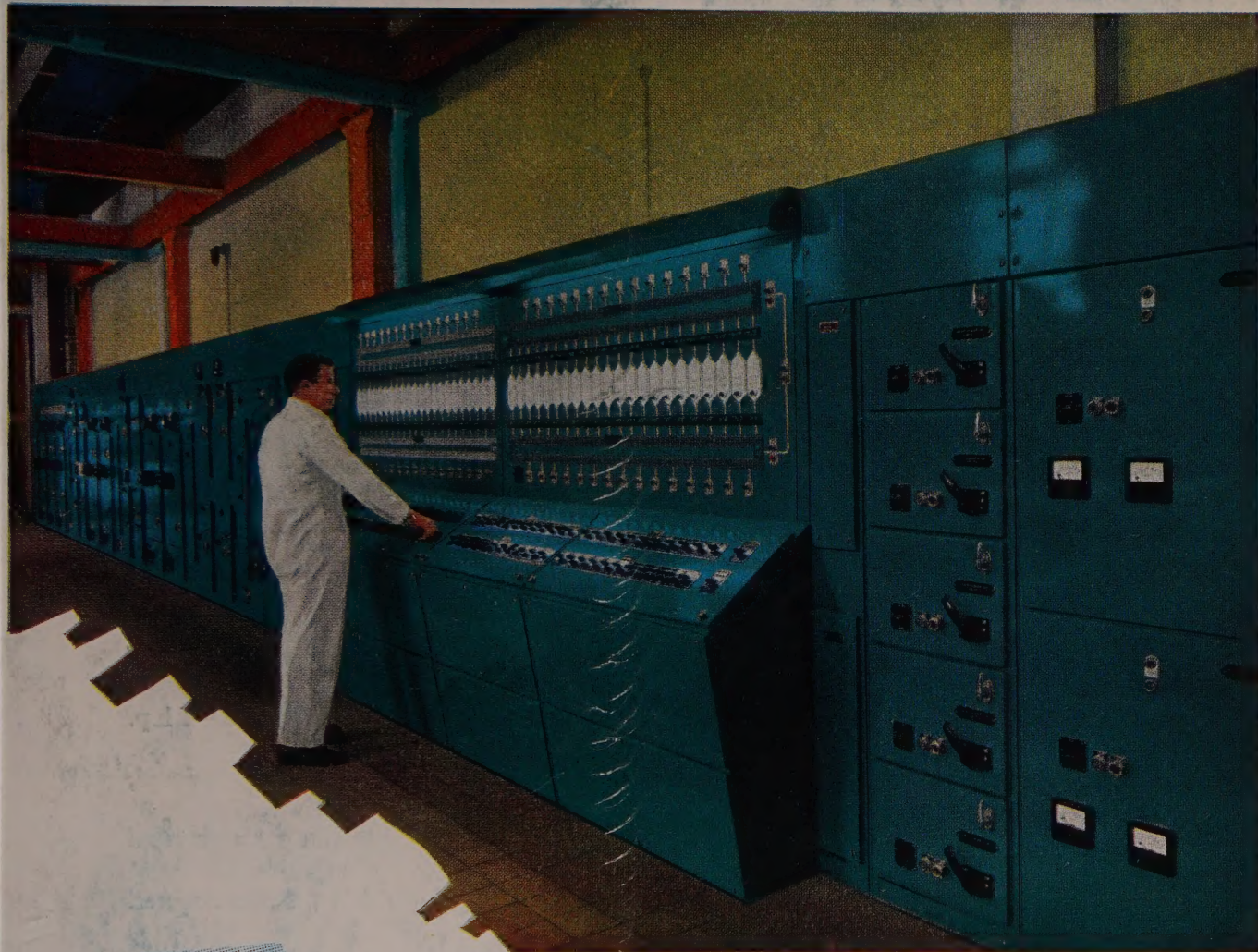


# ELECTRICAL REVIEW

FRIDAY  
12 MAY 1961

WEEKLY  
PRICE 1s 6d



*The flush fronted cubicle type motor control switchgear at the Associated Feed Manufacturer's plant in Belfast was entirely designed and built up from Belmos units. (Photograph by courtesy of Associated Feed Manufacturers Ltd., Belfast.)*

Forty years of experience devoted exclusively to the manufacture of motor control gear have enabled Belmos to offer a unique service in the field of design, construction and installation of switchgear for Industry.

units  
of  
control

**the Belmos company ltd**

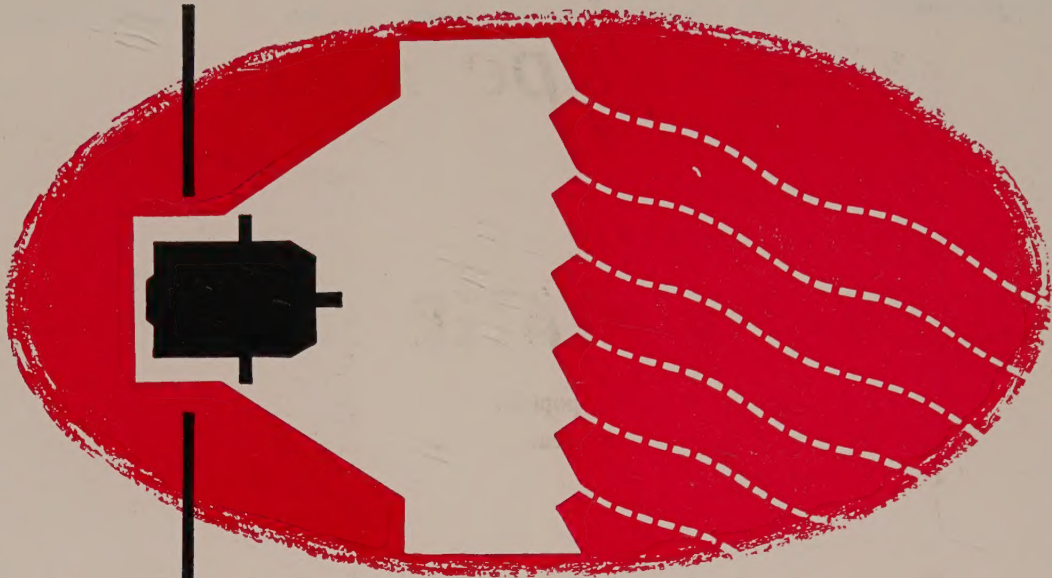
Bellshill Lanarkshire Tel : Bellshill 2284

LONDON GLASGOW BIRMINGHAM NEWCASTLE MANCHESTER SHEFFIELD CARDIFF

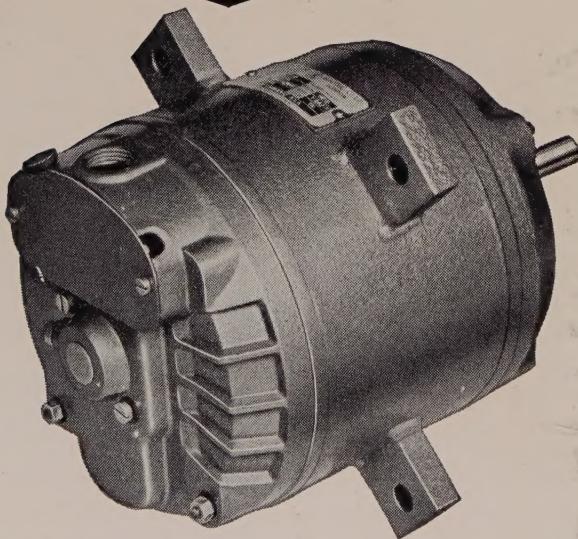
**Belmos**  
**of Bellshill**



## Standard motors



*for every Unit Heater Drive*



In the extensive range of  
'ENGLISH ELECTRIC' f.h.p. motors there  
is a machine suitable for every type of  
unit heater drive. Outputs of 1/20–1 h.p.  
are available with totally-enclosed,  
totally-enclosed air stream rated  
or drip proof enclosures.

# 'ENGLISH ELECTRIC'


f.h.p. motors

THE ENGLISH ELECTRIC COMPANY LIMITED, ENGLISH ELECTRIC HOUSE, STRAND, LONDON, W.C.2  
F.H.P. Motors Department, Bradford

WORKS: STAFFORD · PRESTON · RUGBY · BRADFORD · LIVERPOOL · ACCRINGTON



# PROVEN EFFICIENCY IN A NEW SETTING

 *Cistern Type* FB (FLAT)

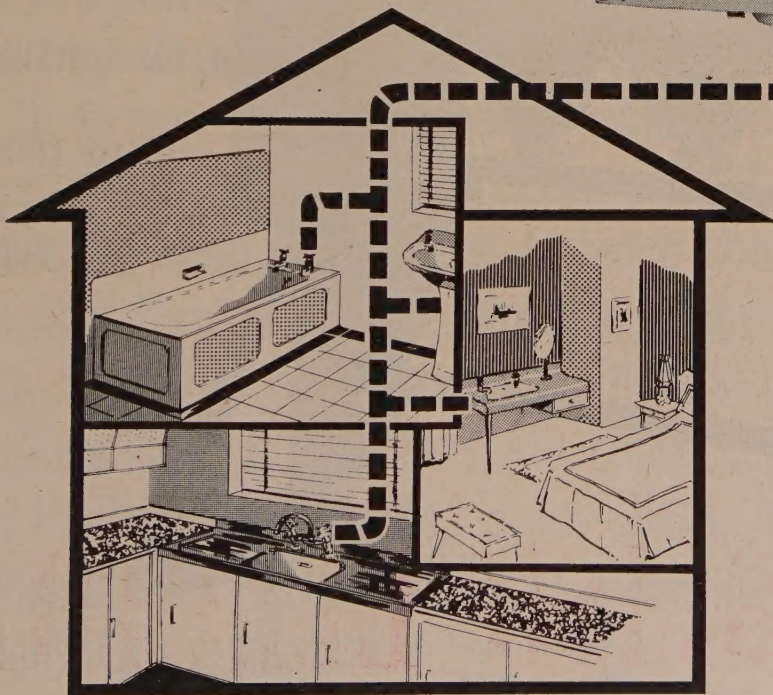
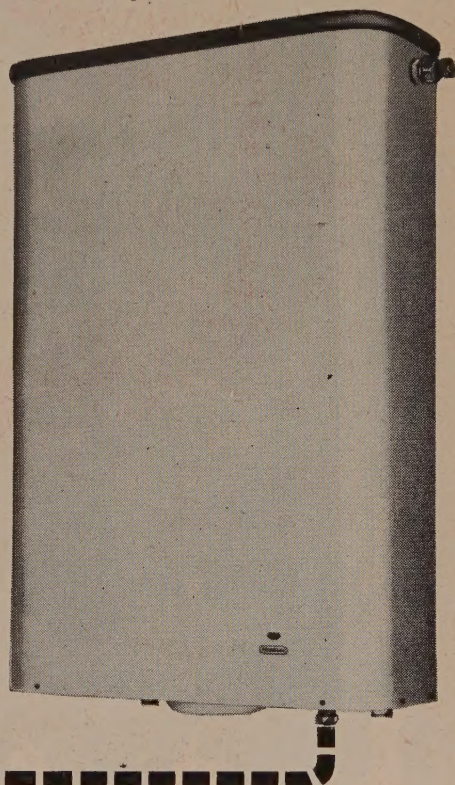
## Automatic Control ELECTRIC WATER HEATER

In keeping with modern trends, this ever popular heater has now been restyled to give even cleaner, more attractive lines than hitherto.

Essentially for wall fixing, the FB is

### A COMPLETE MULTI-POINT HOT WATER SYSTEM

... specially suitable to take advantage of Government grants for the modernisation of old properties.



Capacities  
(gallons) 5 12 15  
Loadings..... 3kW 3kW 3kW  
Voltage range  
200-220 or 230-250 volts

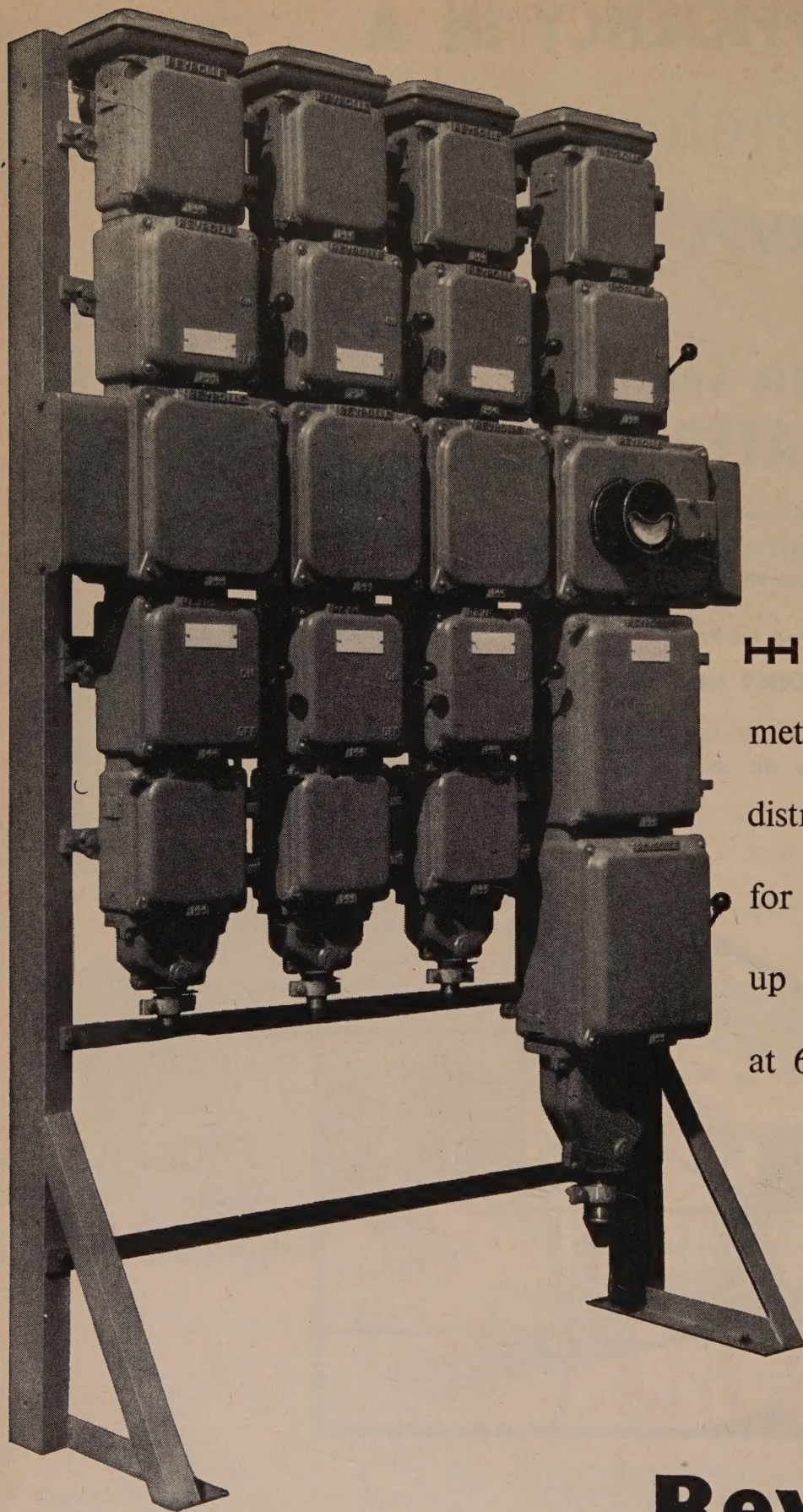
## HEATRAE LTD.

Please write for leaflet 101

NORWICH • NORFOLK • NOR 29A • ENGLAND

Telephone: Norwich 23193 (Private Exch.) Telegrams: HEATRAE, NORWICH



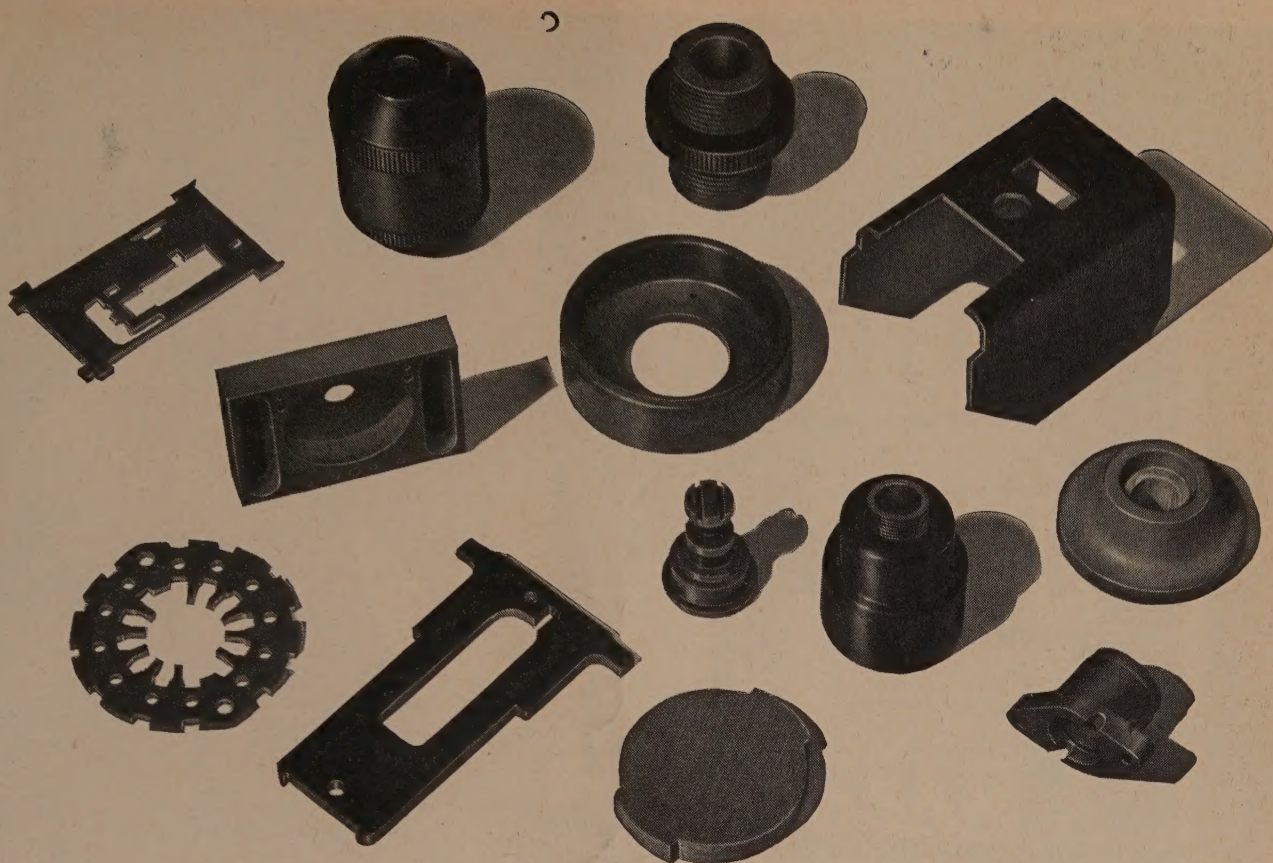


**H** unit-construction  
metalclad  
distribution-gear  
for installations  
up to 1600 amperes  
at 660 volts A.C.

# Reyrolle

A. REYROLLE & COMPANY LIMITED • HEBBURN • CO. DURHAM





**They're all the same...**made of the same materials...machined to the same high degree of accuracy...produced in hundreds or thousands, they may come in a variety of shapes and sizes but are all prepared with the same precision and reliability. Produced on tools from our own tool rooms, Delanco components can be stamped, turned, formed and machined to your own specifications from a wide range of non-metallic materials-Vulcanised Fibre, Presspahn, Glass Fibre, P.T.F.E., Bakelite, sheet, copper-clad or tube, Ebonite, P.V.C., Cellulose acetate, Epoxy Glass, Mica or Micanite. We are specialists in the use of these materials in sheet, rod or tube for electrical insulation.

*Dependable*

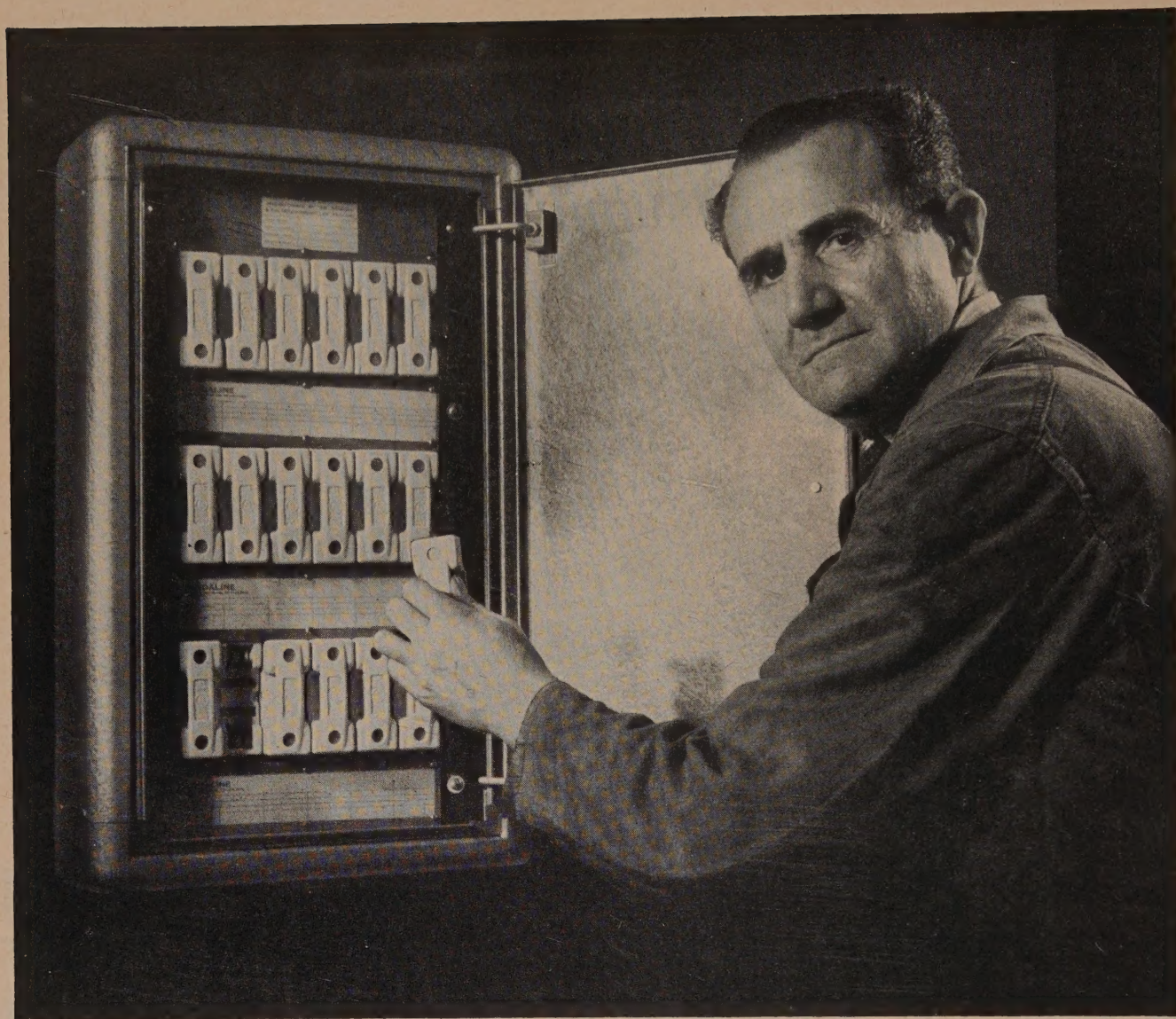
***Delanco***

for Electrical Insulation

Anglo-American Vulcanized Fibre Co. Ltd.  
Cayton Works, Bath Street, London, E.C.1.  
CLE. 8484. Grams: Prompserv, Cent, London.  
Delanco Works, Leonard Street, London, E.C.2.







**simply  
a matter  
of  
confidence**

Ask any experienced electrical man. He'll tell you right away that you can have absolute confidence in anything Sanders make. No ifs, buts or doubts. If it's a Sanders job it's the best obtainable and it will never let you down. Take the SANDALINE Fuseboard, for instance, designed to meet today's modern requirements. With its ingenious smooth line case, detachable ends and sides, the 'Sandaline' has easily reversible fusebanks all making for ease and speed of wiring. Rewirable or H.R.C. Fuse Carriers can be fitted at will, since the 'Sandaline' has the tried and proved 'Sandaspeed' Duplex Fuse Units originated by Sanders. Absolutely rigid and dustproof, and incorporating a cylinder type lock with interchangeable keys, the 'Sandaline' Fuseboard is finished in steel-hammered grey stove enamel inside and out. But that's not all. It's a quality job. It's that little bit better than the best. In short, it's a Sanders job.

**SANDERS**





## Rolled thread screws

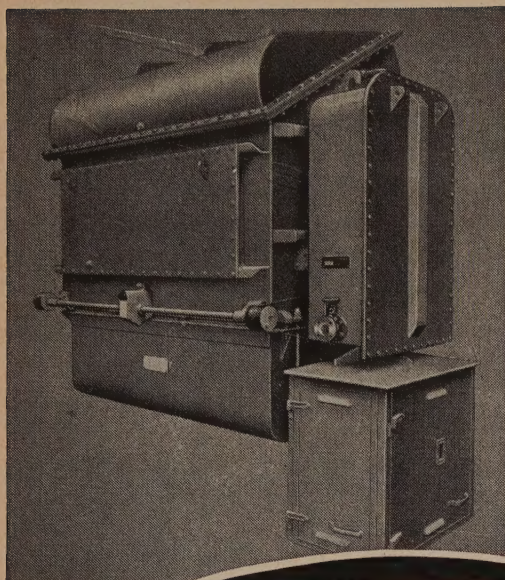
Take no chances about your supplies of Rolled Thread Screws—specify **ORMOND** and so make sure of both quality and quantity—delivered right on time and straight from our extensive stocks. For your individual requirements, we will gladly submit special quotations. Send for lists, which in addition to detailing Brass, Steel and Light Alloy Screws in Rolled and Cut Threads, also feature Grub-screws, Nuts, All-threads, Hexagon Bolts and Set-screws turned from bar and Cold Headed Grades “A”, “B” and High Tensile. The repetition parts range covers single and multi-spindle automatics up to  $1\frac{1}{4}$ ” diameter.



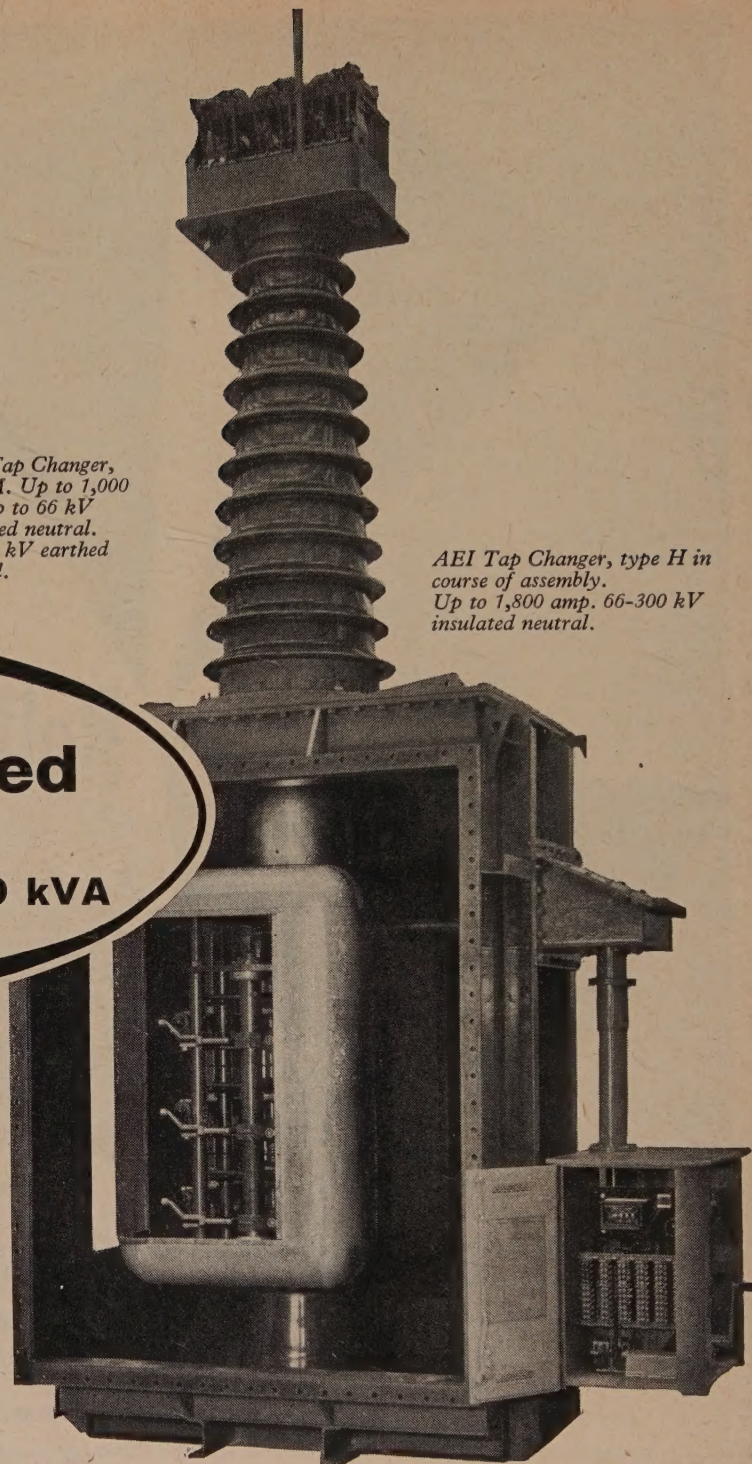
**THE ORMOND ENGINEERING CO. LTD.**

Ormond House • Rosebery Avenue • London, E.C.1 Telephone: TERminus 2888 Telegrams: "Ormondengi, Cent"





*AEI Tap Changer, type M. Up to 1,000 amp up to 66 kV insulated neutral. 66-275 kV earthed neutral.*



*AEI Tap Changer, type H in course of assembly. Up to 1,800 amp. 66-300 kV insulated neutral.*

**Over  
2,000 supplied**

or on order

**aggregating 42,000,000 kVA**

#### **AEI HIGH-SPEED RESISTANCE ON-LOAD TAP CHANGERS**

AEI have been manufacturing on-load tap changers since 1926. Up to 1933, only reactor-type tap changers were supplied, but since then AEI have supplied or have on order over 2,000 high-speed resistance on-load tap changers with an aggregate of over 42 million kVA.

Here are some of the reasons why people chose—and have gone on choosing—these outstanding units:

- ★ Reliable operation
- ★ Long life contacts
- ★ Low maintenance
- ★ Iron-clad units
- ★ Positive follow-up device (patented)
- ★ Minimum oil carbonisation

AEI on-load tap changers for transformers are used for power and distribution, electric furnaces, rectification, voltage regulation and traction.

*For further details write to your local AEI office or direct to AEI Transformer Division, Southmoor Road, Wythenshawe, Manchester, 23.*

**AEI**

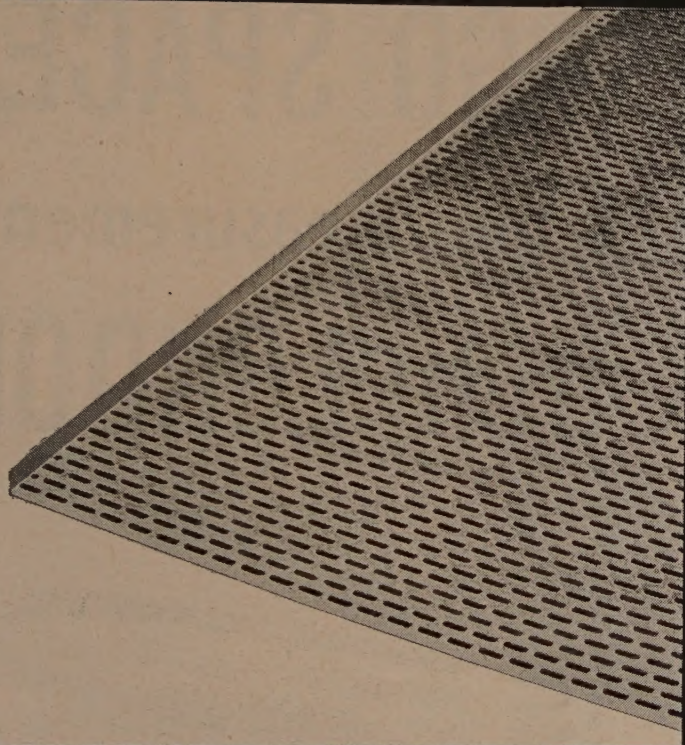
**Associated Electrical Industries Ltd.**  
**Transformer Division**  
**MANCHESTER & RUGBY**

E/A001

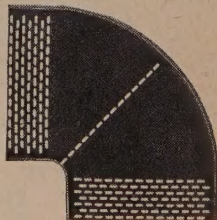
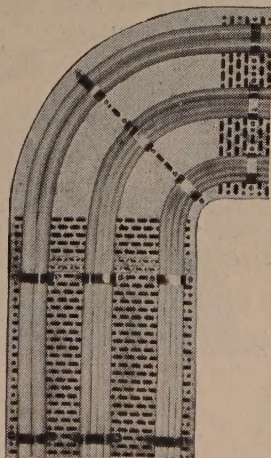
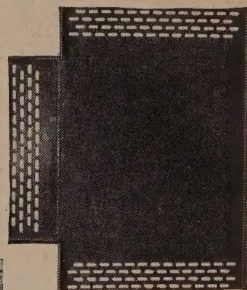


# Cut installation costs

# Braby



## PERFORATED CABLE TRAYS



In today's go-ahead industries, the slow, complicated methods of yesterday have no place. Now, when cables need to be carried, modern Braby Trays answer all requirements ideally. They are easy to fit, take the least possible time to install, are permanent fixtures and reduce costs appreciably. The perforations save weight, facilitate handling and ensure adequate ventilation. Braby Perforated Cable Trays are obtainable in painted, self-coloured, galvanised or plastic-coated steel and in aluminium alloy. In widths from 2" to 36". Standard length 8 ft. Bends and tees also available.

**Available from stock**

FREDERICK *Braby* & COMPANY LIMITED

CRAYFORD: LONDON WORKS, THAMES ROAD, CRAYFORD, KENT. TEL: CRAYFORD 26262

HEAD OFFICE: BRABY HOUSE, SMITHFIELD STREET, LONDON, E.C.1. TEL: CENTRAL 2388

CRAYFORD · LIVERPOOL · GLASGOW · BRISTOL · BELFAST · PLYMOUTH

MEMBER OF BRABY OF BRITAIN GROUP





*Only Pan Am Clipper\* Cargo offers...*

# 143,062 cubic feet of BOOKABLE CARGO SPACE!

(that's space for 3,576 tons measurement)

## EVERY WEEK from LONDON

(Pan Am Summer Schedules 1961)



*Two-thirds* of this great weekly total can be reserved on giant *Jet Clippers* for fastest delivery to world-wide markets.

*For space reservations and further details call  
your freight agent, or Pan Am at:*

LONDON . . . .	GERrard 9905
BIRMINGHAM . .	CENtral 8731
MANCHESTER . .	DEAnsgate 3981
BRADFORD . . .	BRADford 31717
GLASGOW . . . .	CITy 5744

# PAN AMERICAN

**FASTEST DELIVERY TO ALL THE WORLD**

\*Regd. Trade Mark, U.S. Pat. Off.



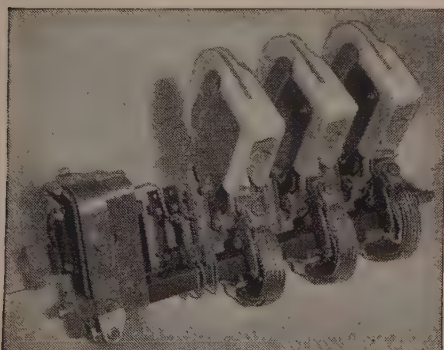


...and when  
it came to  
**CONTACTORS**

the choice was



Acknowledgements to P & O Steam Navigation Co. Ltd., and Harland & Wolff, Ltd. Photograph by Central Press Photos Ltd.



500 AMP rated T.P. Contactor, fitted one normally open and one normally closed auxiliary contacts, as supplied for use as remote controlled isolators for part of the equipment supplied from each masterboard of the S.S. Canberra.

Some very advanced thinking went into the design of the giant P & O Liner S.S. Canberra. With accommodation for 2,235 passengers, its speed of  $27\frac{1}{2}$  knots will cut the London-Sydney run by six days. Accuracy and efficiency were essential—right down to the smallest component—and when it came to the operation of remote controlled isolators from the masterboards the contactors specified were G.W.B. Containing many unique features, all G.W.B. Contactors are type tested and approved to category A.4, Mechanical Duty Class III and IV to B.S.S.775 (1956). Full details of the complete range on request.



**G.W.B. FURNACES LTD (CONTROL GEAR DIVISION)**  
P.O. BOX 4 • DIBDALE WORKS • DUDLEY • WORCS.

Tel: Dudley 55455. Cables: Gibwilbar, Dudley. Associated with Gibbons Bros. Ltd. and Wild-Barfield Electric Furnaces Ltd.

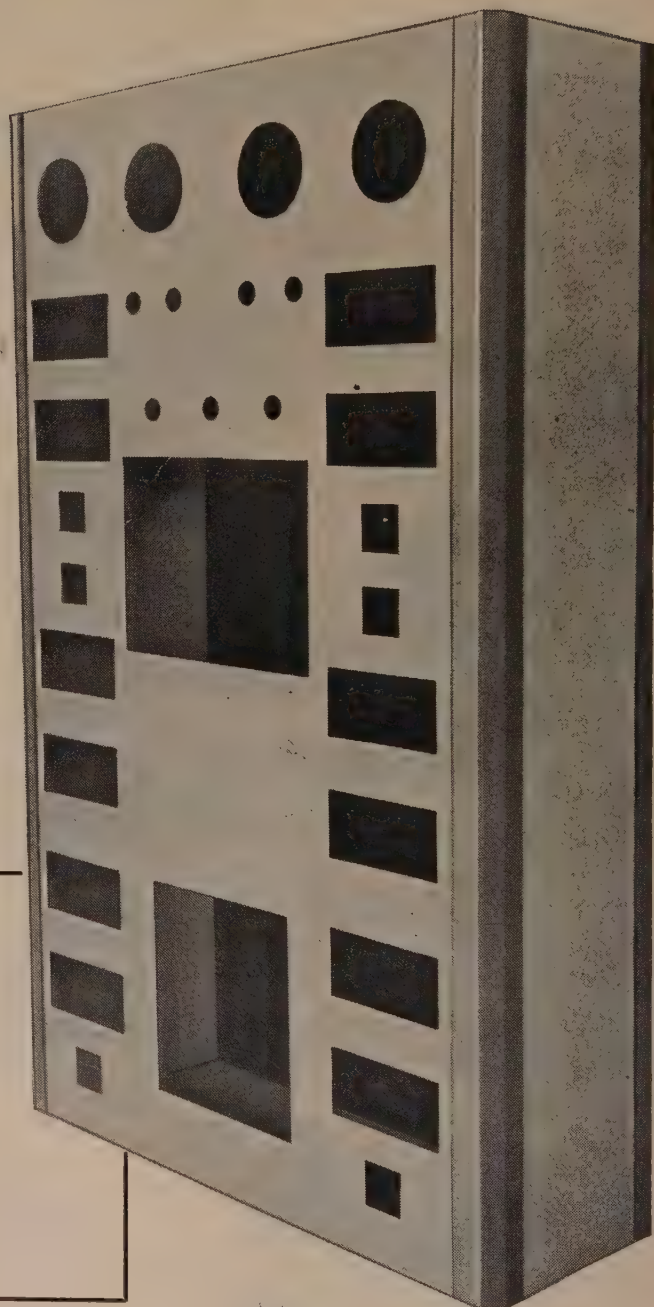


# Datum INDUSTRIAL CUBICLES

## TYPE CP

- \* Heavy-duty cubicles suitable for electrical and industrial instrumentation.
- \* Full-width front plates for mounting indicating and recording instruments. Standard widths: 2' 0", 2' 6", 3' 0", 3' 6", 4' 0" and 4' 6".
- \* Complete rear access by means of lift-off panel, fitted C/P handle.
- \* Clear space for underfloor cabling and ducting.

A Typical Control Panel... One of a range which can be supplied with apertures to your specific requirements. Standard Finishes are Light Grey 631 and Dark Grey 632 (BS 381<sup>C</sup>) but special colours are available to order.



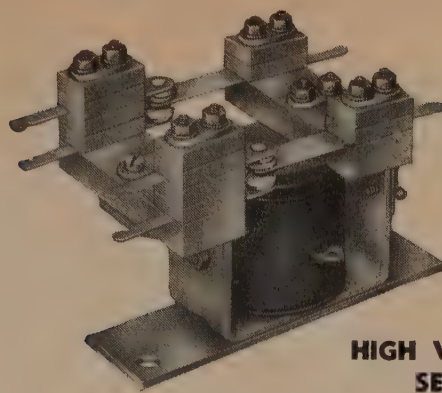
CABINETS • CASES • CONSOLES • CHASSIS UNITS

**DATUM METAL PRODUCTS LTD.**

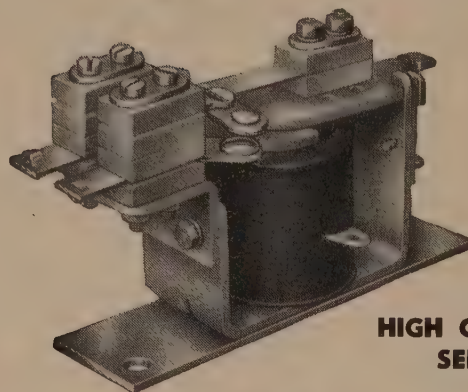
Telephone: Watford 22351  
Telegrams: Datum, Watford

COLNE WAY TRADING ESTATE • WATFORD-BY-PASS • WATFORD • HERTS

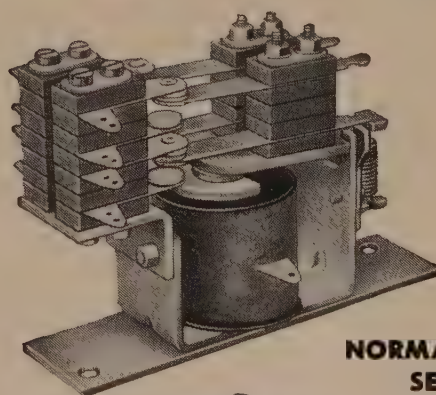




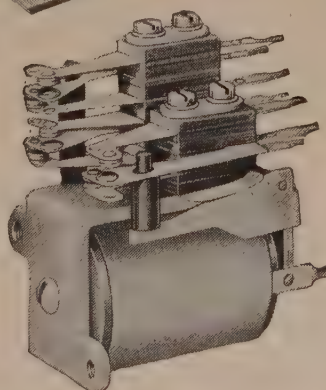
**HIGH VOLTAGE  
SERIES**



**HIGH CURRENT  
SERIES**



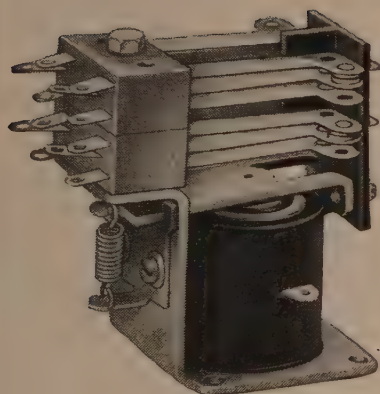
**NORMAL DUTY  
SERIES**



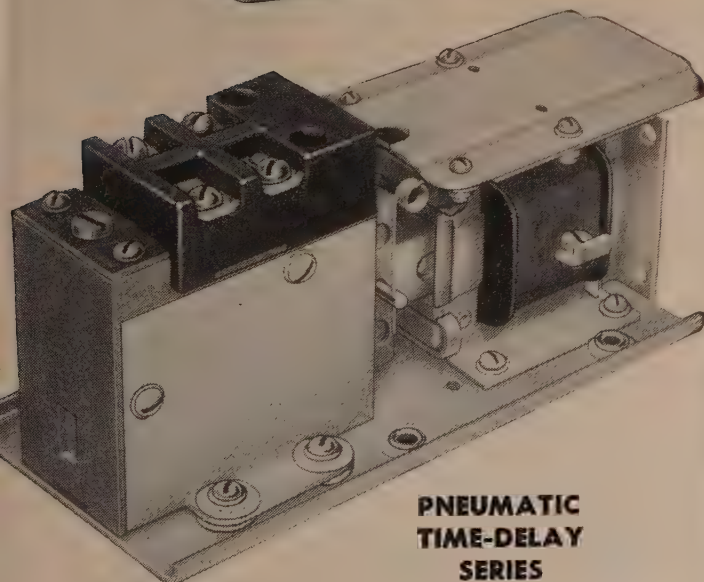
**MINIATURE  
SERIES**



**MINIATURE  
MOVING COIL  
SERIES**



**GATE OPERATED  
SERIES**



**PNEUMATIC  
TIME-DELAY  
SERIES**

# PRECISION RELAYS

*Illustrated technical data sent on request :*

**ELECTRO METHODS LTD., General Products Division, CAXTON WAY, STEVENAGE, HERTS**  
**Telephone: Stevenage 2110-7**





# DALY

## ELECTROLYTIC CAPACITORS

Daly have specialised in the manufacture of electrolytics for over 20 years. Recent developments in the lower working voltages associated with transistors have greatly increased the capacitance obtainable in a given physical size—over 30,000 microfarads are possible in a single unit. Daly are always ready to design for special requirements; they make aluminium electrolytics of all types.

DALY electrolytics for transistorised equipment • for telecommunications • for radio and television receivers • for miniaturised equipment • for pulse and storage circuits • for capacitor start motors, etc.

*Send for descriptive leaflets!*

## DALY (Condensers) LTD.

WEST LODGE WORKS, THE GREEN, EALING, LONDON, W.5.

Phone: Ealing 3127-8-9

Cables: Dalycon, London

**PLASTIC  
MOULDINGS**

**FREDERICK W. EVANS LTD.**  
Plastic Works, Long Acre, Birmingham 7. Tel. East 3071-2-3



As one of the original manufacturers of Overhead Steelwork we place our many years' experience at your service.

*Send for catalogue*

## WELLINGS, MALE

Tel. W'ton 24691-2-3

& CO. LTD.

FALCON WORKS, CARTWRIGHT ST. WOLVERHAMPTON





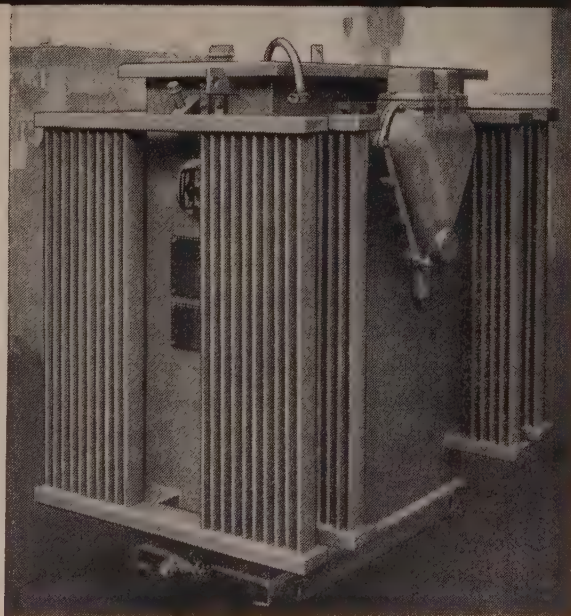
"I CAN ONLY JUST HEAR IT"

"NATURALLY, IT'S THE BRUSH T1"

*The low noise level of the present range of Brush T.I Distribution Transformers has to be heard to be really believed—and that's not the only advantage. Their compactness is surprising too. The British T.I. series will be particularly appreciated by authorities who find it necessary to increase output of their existing transformer sub-stations to meet increasing demands for power, without carrying out major alterations to buildings. A modern Brush 500 kVA transformer can be placed in a sub-station building originally designed for a 300 kVA transformer, and with room to spare!*



*A member of the Hawker Siddeley Group.*





# INSTALL WITH CONFIDENCE

SELL



## IMMERSION ELEMENTS

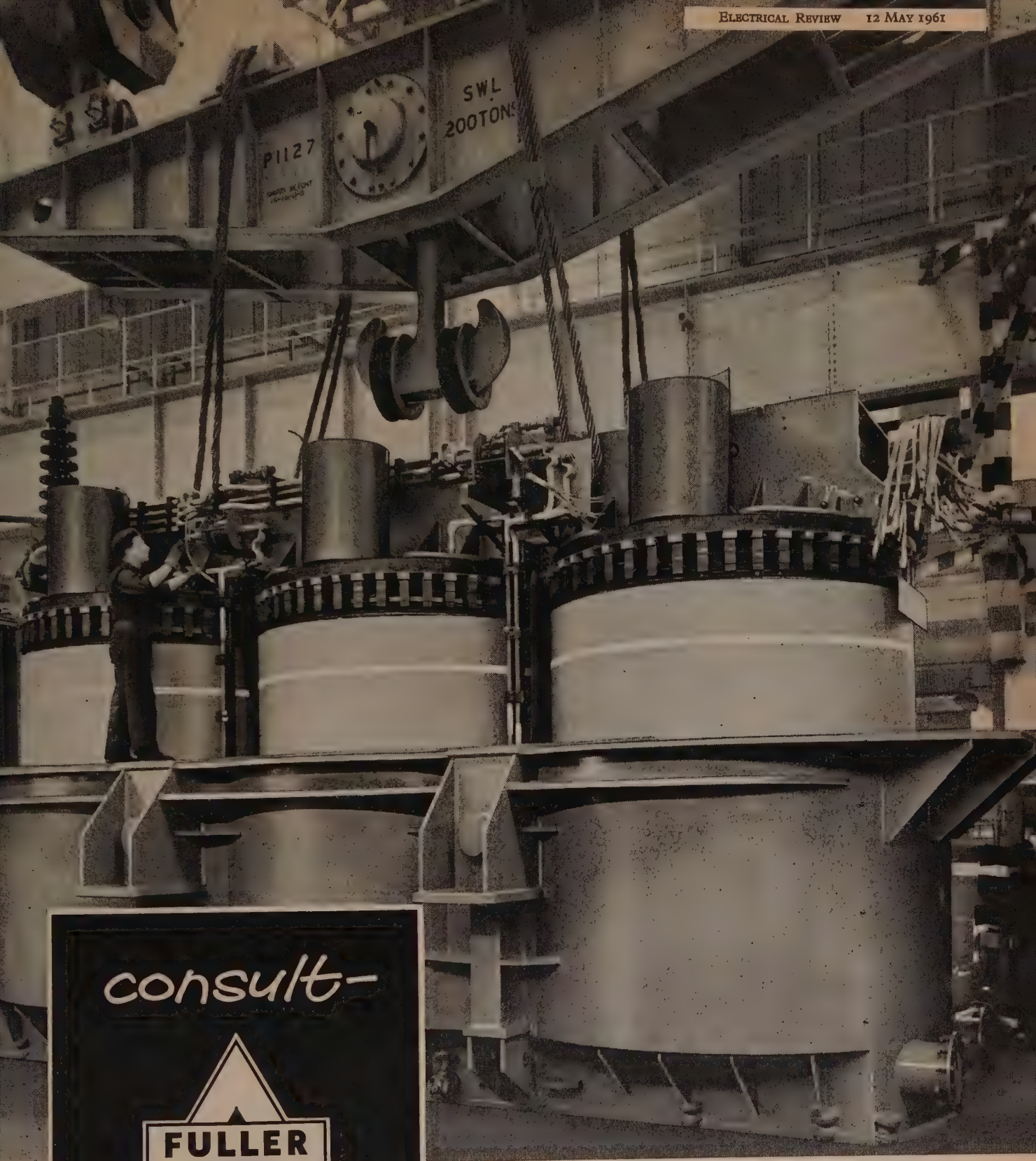
The Swan Brand 3 kw immersion elements can be fitted with full confidence in their reliability and efficiency in operation. The design and construction has been based upon many years' pioneering work and experience in the application of the immersion element to our well-known Swan Brand Electric Kettles—sell CONFIDENCE—sell Swan Brand Immersion Heaters.

3 kw Immersion Elements non-withdrawable type with or without thermostat. Shallow head facilitates fitting in confined spaces. Screwed  $2\frac{1}{4}$ " B.S.P. made to B.S.1556/49

### EIGHT SIZES

11"	Cat. No.	311 H.V.
14"	" "	314 H.V.
18"	" "	318 H.V.
21"	" "	321 H.V.
24"	" "	324 H.V.
27"	" "	327 V.
30"	" "	330 V.
36"	" "	336 V.





*One of the two Rectifier Transformers under construction at our Works for the C.E.G.B. Lydd Terminal Station of the Cross Channel D.C. Power Link. These units are rated at 95/95/65 MVA 284/83.6/33 kV and are believed to be the largest in the world.*

consult-



*A member of the Hawker Siddeley Group*

*Sole U.K. representatives for ASEA Sweden*  
**FULLER ELECTRIC LIMITED**  
 FULBOURNE ROAD · LONDON E.17  
 Telephone: LARkwood 2350

*Also at Birmingham, Glasgow and Manchester*

Modern plant and more than 40 years' experience ensure that we are particularly well-equipped to manufacture transformers up to the largest sizes and the highest voltages. Thanks to our long association with ASEA of Sweden, we have access to an unrivalled experience of 380kV practice. Our up-to-date equipment includes a large vacuum drying chamber, a 200 ton coil pre-shrinkage press and comprehensive plant for both routine and impulse testing.

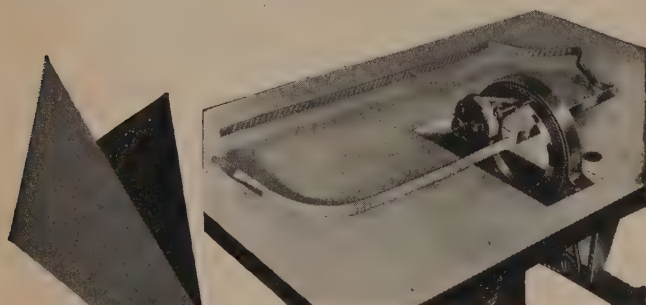


ADD EFFICIENCY TO ELECTRICITY  
with these specially designed, sturdy, dependable

# Quickway

machines

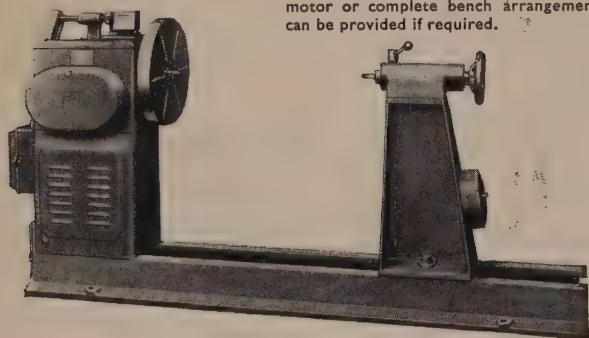
MD/3



## TAPING MACHINE (Model TA)

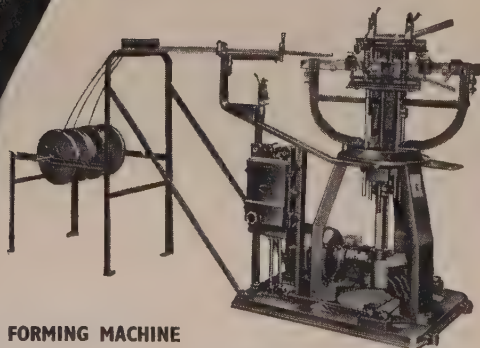
Tapes, bars, open coils and wiring assemblies with cotton, woven glass, plastic tapes and most types of empire or cambric tapes up to a tape size of 1". Taping speed 300 r.p.m. Variations up to 500 r.p.m. can be provided on request.

Individual items such as clutch unit and motor or complete bench arrangement can be provided if required.



## HEAVY DUTY COIL WINDING & BANDING MACHINE

Four Speed Lathe Type Coil Winding Machine for the heavy and larger type of transformer, interpole and field coils, etc.



## COIL WINDING & FORMING MACHINE

Uniformly shaped armature and stator coils up to 42" loop length in one operation. Quickly and fully adjustable for continuous manufacture or repair work.

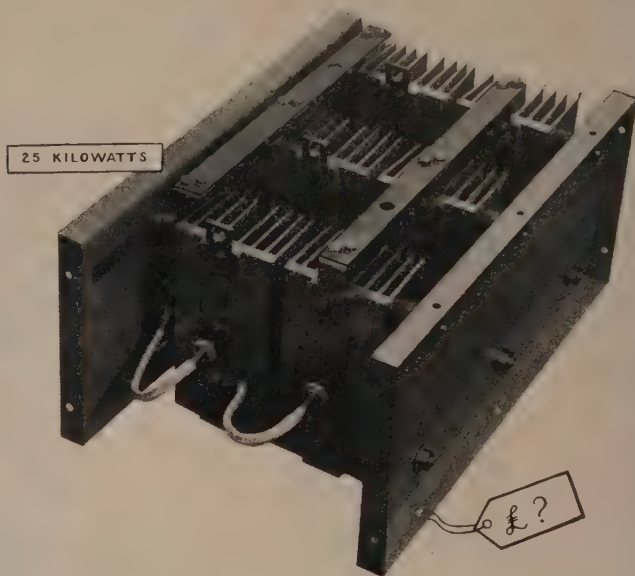
Send for further details of these handy, dependable machines to:



**MIDLAND DYNAMO CO. LTD.**

Quickway Works, 64 Belgrave Gate, Leicester  
Phone: LEICESTER 50151 (8 lines) Grams: "DYNAMO" LEICESTER

*Do you  
get your  
kilowatt's - worth?*



RECTIFIER COSTS CAN BE  
SURPRISINGLY LOW!

The power rectifier stack shown has an output of 135 amperes at 188 volts D.C. and costs only £52. 8. 10d. It is just one of a large range of stacks from 20 to 300 amperes; higher currents may be obtained from multiple arrangements.

Individual cells of 10 ampere and 50 ampere rating with p.i.v. up to 400 v. maximum are available ex stock.

May we tell you more? An enquiry will bring full details.



## J. STONE & CO. (DEPTFORD) LTD.

ARKLOW ROAD, LONDON, S.E.14.

TID. 1202

Established 1831

Full information on request from

**SEMICONDUCTOR DIVISION**

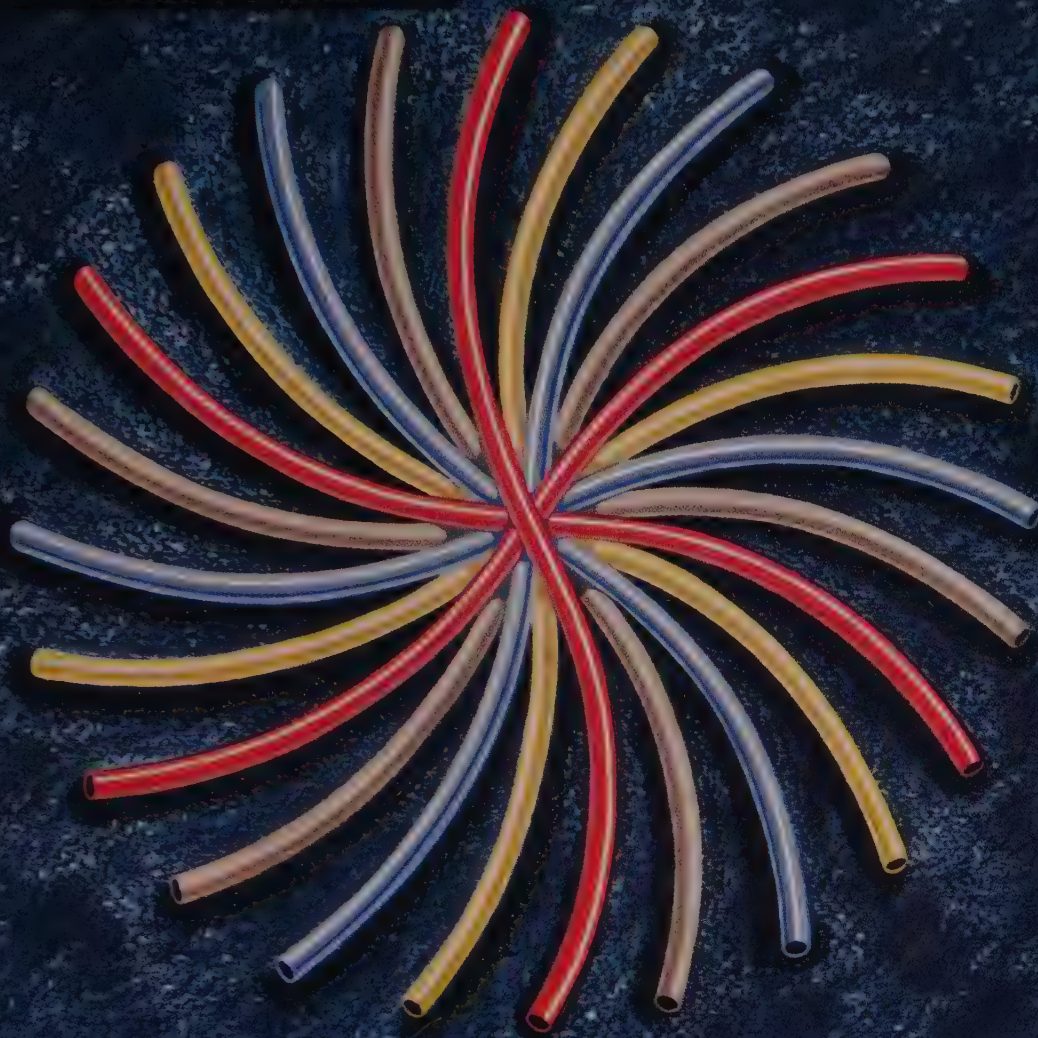
GATWICK ROAD, CRAWLEY.

TEL. 25251





# TRIST SILICONE PRODUCTS



For electrical insulation—  
**SEATRIST Silicone Sleeving**



**RONALD TRIST**  
& CO. LTD.

*(a company of the Bell's Asbestos and Engineering Group)*

Bath Road, Slough, Bucks

Telephone: 25041 Telegrams: Resvalar, Slough

By reason of its excellent insulating properties and outstanding resistance to high temperatures, small diameter silicone rubber sleeving is used in large quantities in a wide range of electrical equipment including mercury switches, fluorescent lighting installations and transistor radios. This sleeving, which conforms to B.S.2848, type 5, Class 180T, can be supplied in a wide range of colours and sizes. It is superior to ceramic beads since it takes up less space, and it does not harden and deteriorate, like natural rubber and P.V.C. sleeving, when exposed to high temperatures.

Write for Technical Brochure ER-R29/6101.



# CASHMORES

# STEEL SHEETS

from STOCK

Accredited  
Sheet  
Stockholders  
of the



Steel  
Company  
of Wales  
Limited

JOHN CASHMORE LIMITED

GREAT BRIDGE  
TIPTON • STAFFS

Tel: TIPTon 2181/7 Telex: 33169

NEWPORT  
MON.

Tel: 66941/6 Telex: 49248

London Office: 75 Victoria Street, SW 1

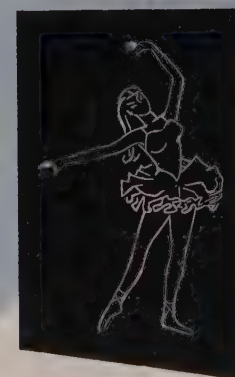
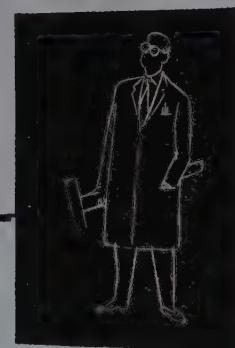
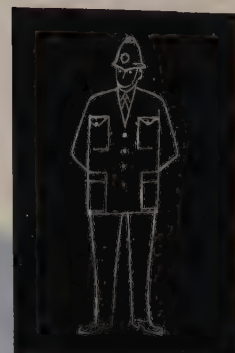
Telephone: ABBey 4556/7/8



# Which lamp ?

*To get the right light on the subject is half-way to success; the rest is a matter of performance.*

And the **SKF** organisation certainly doesn't believe in hiding its light under a bushel. With an exchange of technical information on applications that is international, Skefko have either met your problem before or can draw on the best in research and manufacturing resources to settle it for good—in fact for *your* good!



# SKF

THE SKEFKO BALL BEARING COMPANY LIMITED • LUTON • BEDS

THE ONLY BRITISH MANUFACTURER OF ALL FOUR BASIC BEARING TYPES: BALL, CYLINDRICAL ROLLER, TAPER ROLLER & SPHERICAL ROLLER

G198



*Something you know from experience...*



A reputation for quality products is not won easily. It is something to be jealously guarded.

This is one of the reasons why Switch Fuse Control Units by Wylex offer special features in their design and materials.

Features like the easily accessible terminals, ample wiring room, domed end screws...

Features like the non track mouldings for current

carrying parts; silver inlay Switch Contacts; vice-like contacts between fuse pin and terminal; easy circuit identification... they all represent that *extra WYLEX quality that costs you no more.*

All-Insulated Switch Fuse Control Units: 1, 2, 3, 4, 6 and 8 way. Metalclad: 3, 4, 6 and 8 way. All-Insulated in Brown or Cream. Metalclad, grey hammer finish. Any combination of fuses, rewirable or H.R.C. cartridge.

# **Wylex build quality into—**

## ***Switch Fuse Control Units***



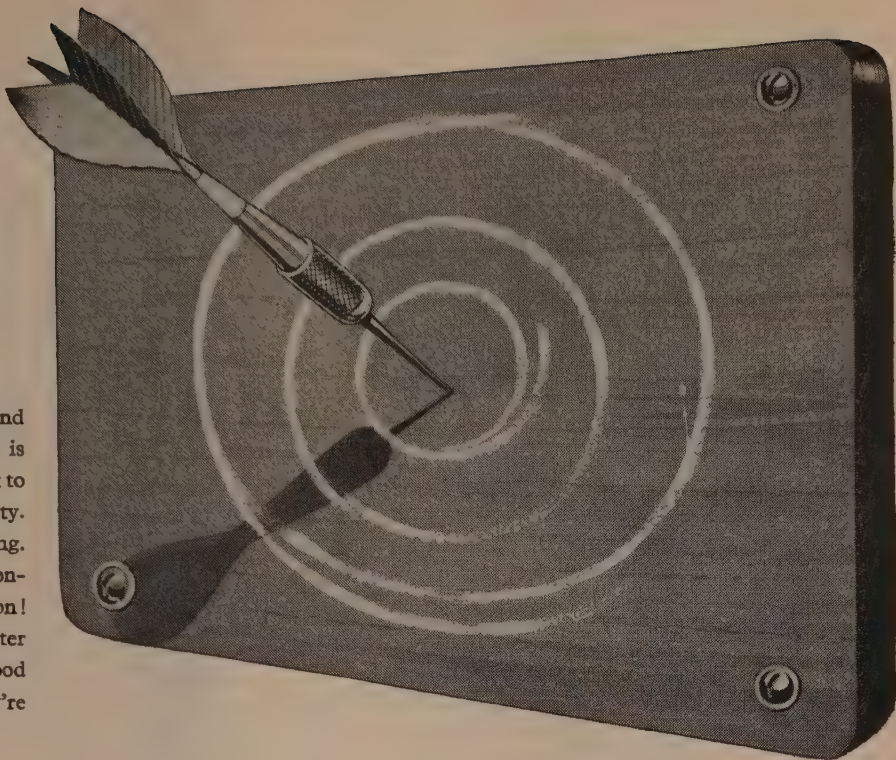
AND COOKER UNITS, SWITCHED SPUR BOXES, SWITCHES, PLUGS AND SOCKETS

**GEORGE H. SCHOLLES & CO., LTD., Wylex Works, Wythenshawe, Manchester 22.**



# Wootton meter boards score every time!

Bound to . . . if they're Wootton-made . . . and Wootton-tested! Only the stoutest plywood is good enough for Wootton. Every piece is put to the test. For reliability, toughness, durability. Wootton meter boards stand up to anything. Even in the most extreme climates. No contraction or expansion or warping with Wootton! Oh, and there's more to Wootton than just meter boards. They're right on the target with wood blocks too, and instrument cases, and they're brilliant at sunk switch boxes.



## WOOTTON-the meter board people

WOOTTON & CO. LTD  
ALMA WORKS · PONDERS END · MIDDX  
Telephone: HOWard 1858

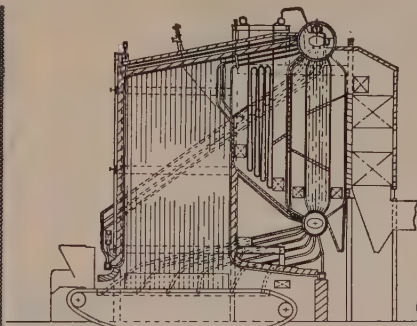
# YARROW INDUSTRIAL BOILERS

Yarrow and Company are fully equipped to supply all sizes of modern stoker, oil or gas fired Bi-Drum Boilers. Recent advances in engineering practice leading to pre-engineering of style and standardisation of components ensure early delivery at competitive prices. Every Boiler Contract is backed by comprehensive engineering and research facilities with efficient after sales service.

Home and Overseas Enquiries invited

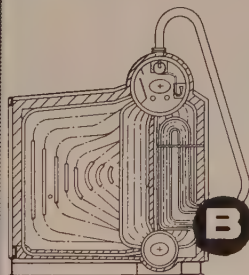
Please write for further details to

YARROW & CO. LTD  
SCOTSTOUN · GLASGOW W4



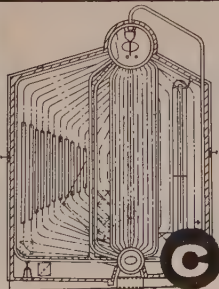
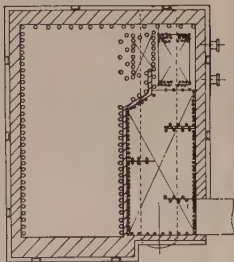
A

One of a comprehensive range of stoker fired boilers.



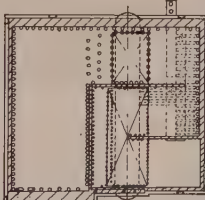
B

Shop Assembled package units for oil or gas firing.



C

A Range of these standard engineered units is available for oil or gas firing.





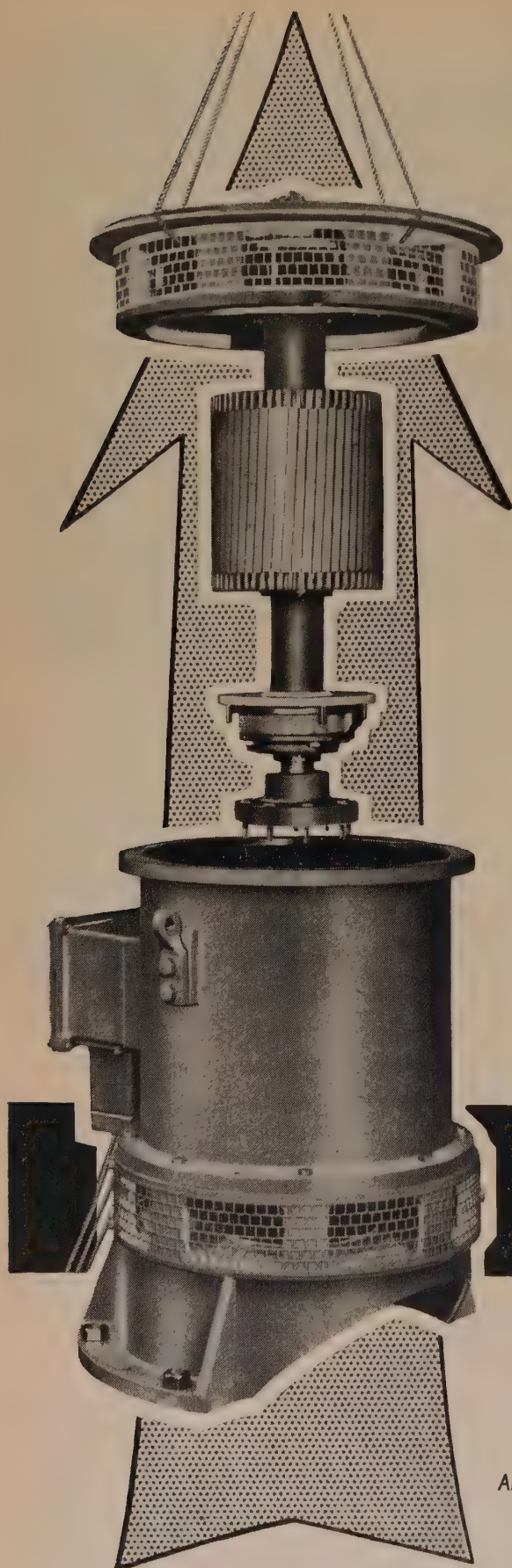
# ALL ALLEN ELECTRIC MOTORS

*are designed for long life and trouble-free service, but it is re-assuring to know that provision is made to gain quick and easy access to the interior for the inspection of any part of a machine.*

Vertical and horizontal A.C. and D.C. motors of all types are designed to suit individual power applications up to 5000 h.p.

A.C. and D.C. control gear can be supplied to suit individual requirements.

*We invite your enquiries*



*Allen electrical equipment is backed by well over 75 years' specialised design and manufacturing experience.*

**Specialists in "SPECIALS"**




## W. H. ALLEN SONS & CO. LTD.

**BEDFORD  
ENGLAND**

Telephone: BEDFORD 67400. Telegrams: PUMP BEDFORD TELEX. (Telex No. 82100)





# BOLT FIXING?

*use the right tools  
and finish the job  
in a fraction of the time*

You will find the quickest way is to drill a hole and use a Rawlbolt.

Rawlplug rapid boring tools produce holes in all forms of masonry in less time than any comparable type. Tools are available for use with electric or pneumatic drills, or as hand drills. Standard sizes range from  $\frac{1}{4}$ " diam. to  $2\frac{1}{8}$ " diam. and many types are made, spiral fluted or straight fluted and with or without DURUM hard tips.

Rawlplug masonry tools are the fastest cutting of their type, with the longest life.

## **RAWLBOLTS** for **SPEED AND STRENGTH**

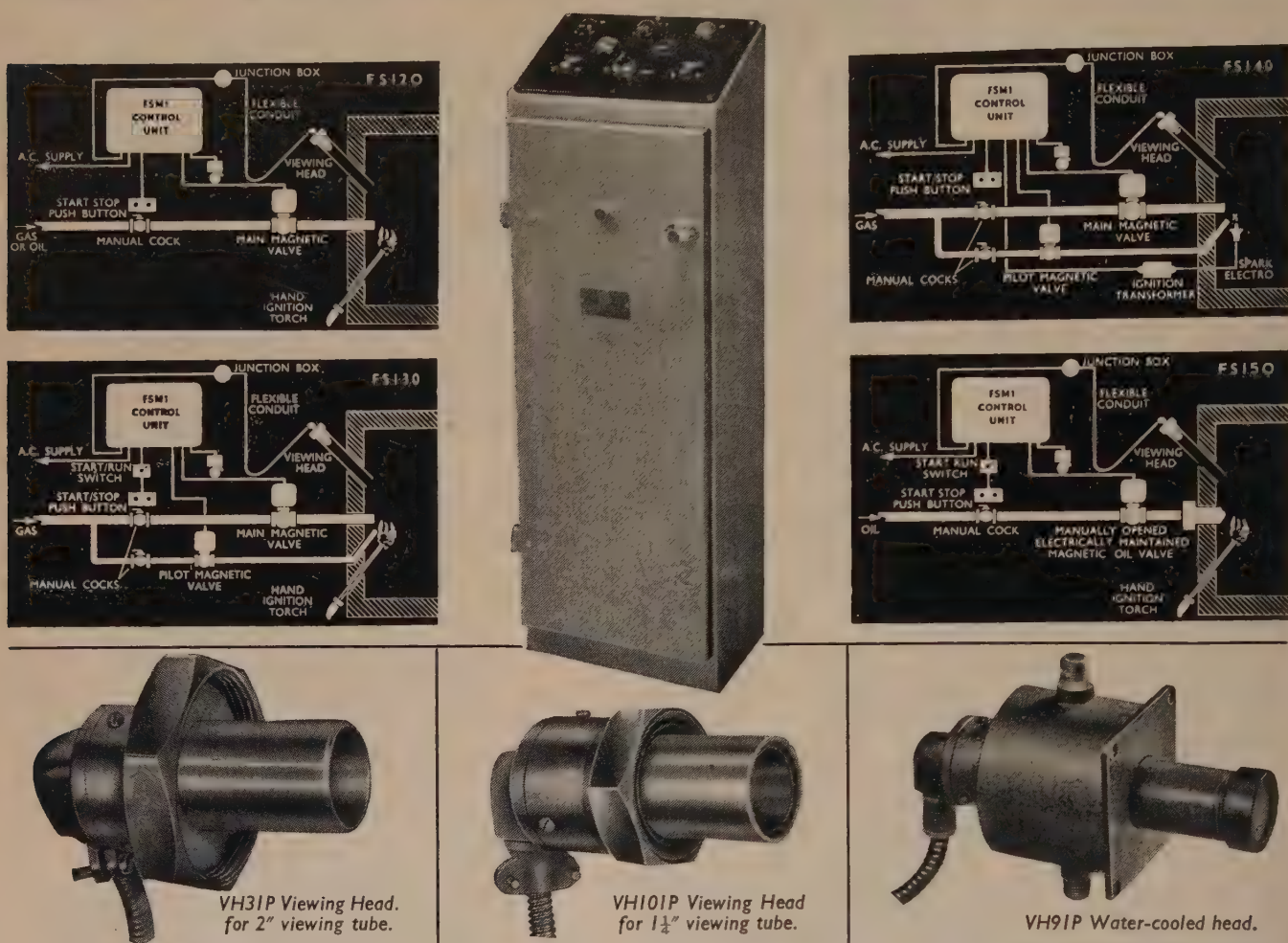
*Rawlbolts are the fastest and most secure method of making Bolt Fixings into any form of masonry.*



**THE RAWLPLUG COMPANY LIMITED**  
CROMWELL ROAD • LONDON • S.W.7  
*The world's largest manufacturers of fixing devices*



# safe automatic burner control



THE LATEST special uses for which we have provided flame failure and ignition programming equipment include the new Tunnel-type gas burners, inert gas generators and gas turbines, and our equipment is in service from Russia to Peru.

#### Elcontrol units include :

Photoelectric types—both straight and flicker-sensitive, for oil burners.

Infra-red sensitive types for gas and gas-ignited oil burners.

The new electrode type (patented) which responds to flame modulation, for certain gas burners.

Flame Proof and intrinsically safe units.

Complete burner control panels to individual requirements.

Manufacturers and users of package and other boilers, furnaces, bakers' ovens, process ovens, methane and other special fuel-burning equipment, are finding our technical service increasingly useful, and we welcome further enquiries.

*for gas, oil and  
oil with gas pilot  
burners*



Standard steel case housing with-drawable chassis for control units.

## ELCONTROL

Regd Trade Mark

### electronic control systems

ELCONTROL LTD • HITCHIN • HERTS

FF

Telephone : Hitchin 2411

#### Appointed Agents

##### MIDLANDS:

A. M. LOCK & Co. Ltd., Newborough Rd. Solihull

##### N. WEST:

A. M. LOCK & Co. Ltd., Union St., Oldham

##### SCOTLAND:

A. R. BOLTON & Co. Ltd., Bankhead Dr., Sighthill Edinburgh 11. CRA 5235/6

Telephone

Shirley 5703

Main 6744



**'Why pick  
on me?'**  
**I said**



Me, work a printing machine? I can't even put a mincer back together. "Don't you worry about that," they said. "This is a Gestelith." And they were right, you know; it only took a few hours to get the hang of it. I print some fabulous things, too—colours, photos; I never thought it could be so easy. It's goodbye to the old typewriter now; I'm happy with my Gestelith.

**A note for the technically minded**

*The superiority of the Gestelith is based on simplicity of control. For example, to switch from full output to idling requires the movement of one lever... the Gestelith automatic controls do the rest. No worries about build-up of ink on plate or blanket, although the machine is still running. Switch back when you're good and ready and take a perfect impression first time.*

It's uncanny — but it's true.



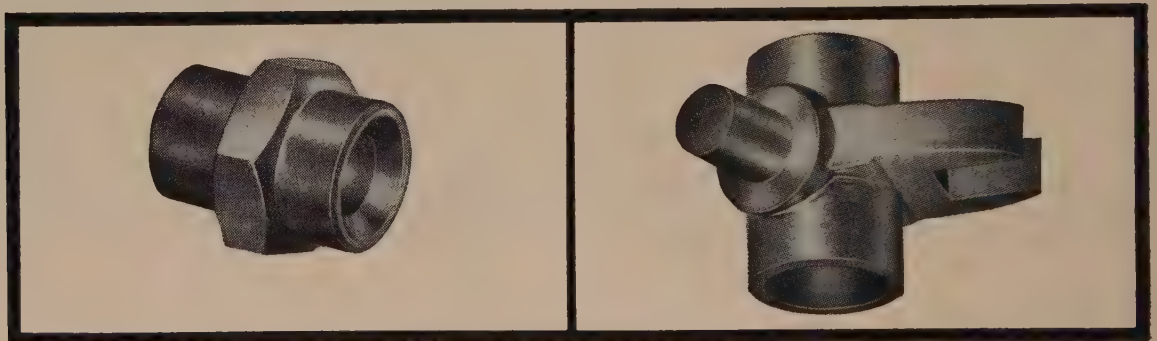
**GESTELITH**  
**OFFSET**  
DUPLICATORS

**GESTETNER DUPLICATORS (B.S.O.) LIMITED**  
GESTELITH DIVISION  
210 EUSTON ROAD, LONDON N.W.1. EUSTON 3238





## The choice is often difficult



## choosing a winner calls for expert judgment...

... and it's the same when choosing between Die Castings and Hot Pressings. For expert advice come to us, for we make *both*! The special experience of our organisation — two separate yet inter-related operations under one roof — is your guarantee of obtaining the correct unit for *your* needs.

Whenever you require a constant or phased supply of dimensionally accurate parts in *Brass, Bronze, Copper or Aluminium* — see us first! Our technical representatives are always at your service.

**BRASS PRESSINGS (LONDON) LTD • THE NON-FERROUS DIE CASTING CO. LTD.**

NON-FERDICA WORKS, NORTH CIRCULAR ROAD, LONDON, N.W.2. Telephone: GLAdstone 6377



**REAL**

## Watertight Protection

Come hail, rain or shine, R.E.A.L. Non-Corrosive Watertight Fittings stand the test of time in any part of the world. There just isn't anywhere in this all-porcelain one-piece fitting where rain or damp of any kind can do damage. Incidentally, it's a matter of seconds to unscrew the well glass to fit a replacement lamp. This is R.E.A.L. saving in time, money and maintenance!

*with***REAL**

## Watertight Fittings

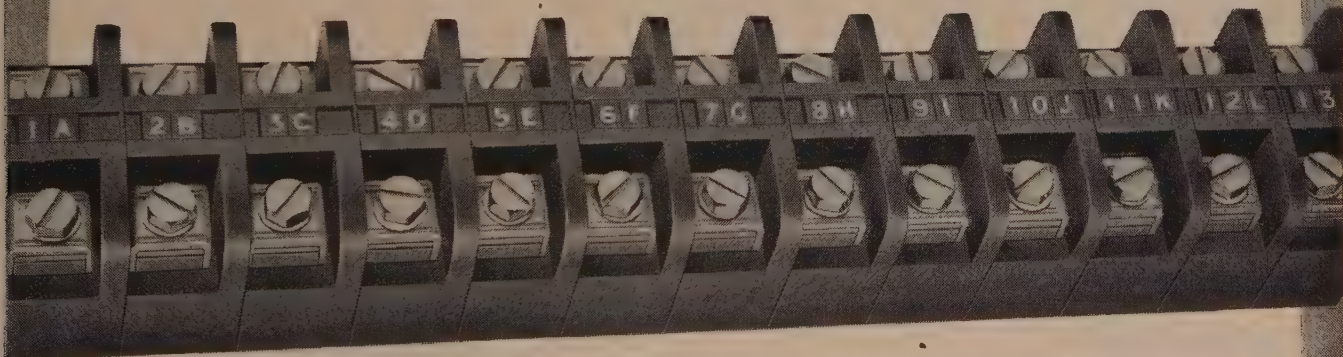
R.E.A.L. is the registered trade mark of  
ROWLANDS ELECTRICAL ACCESSORIES LTD., R.E.A.L. Works, Birmingham, 18



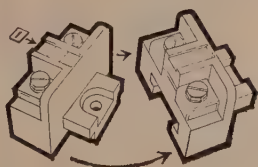
Patent No. 568702

Catalogue No.  
P5806 gives details  
of all sizes from  
60 watt to 500 watt.

Join as many of us as you like



## **MTE** MULTI-LOCK TERMINAL BLOCKS



With Multi-Lock you can build up complete terminal block assemblies consisting of any number of single units you choose. They are available in three ratings (15, 40 and 100 amp.) and can be mounted to any surface without special brackets or channels. The 40 amp. and 100 amp. blocks also interlock with one another to give two different ratings in one assembly. All Multi-Locks meet B.S.I. and C.S.A. specifications.

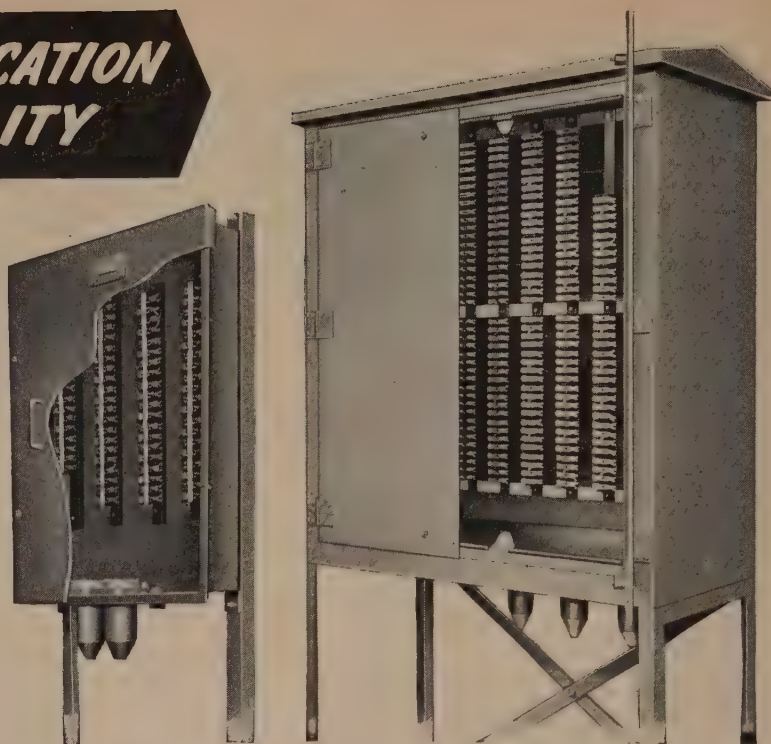
For immediate delivery or further details ring Southend 524281.

M.T.E. CONTROL GEAR LTD · LEIGH-ON-SEA · ESSEX M4



## RAILWAY ELECTRIFICATION DEMANDS RELIABILITY

TERMINAL BOXES  
AND  
CONNECTION CABINETS  
FOR  
BRITISH RAILWAYS  
TELECOMMUNICATION  
AND  
SIGNALLING SYSTEMS



**AUSTIN TAYLOR ELECTRICAL LTD.**

THORLEY ST • FAILSWORTH • MANCHESTER

Tel:  
FAILSWORTH  
3246

We still specialise in

## SPINNINGS



### REFLECTOR

spinnings  
to customers'  
own designs  
UP TO 36" DIAMETER

## STOCKFIELD

*The Midland Metalworkers*

but **NOW** do

## PRESSINGS

as well

pressings of all types

We have installed new plant  
to enable us to extend our  
service to the electrical trade.

Deep Drawing up to 8"  
depth. Finishes as required.

*Send us your enquiries*

MANUFACTURING  
CO. LTD.

**MORCOM ROAD, GREET  
BIRMINGHAM 11**

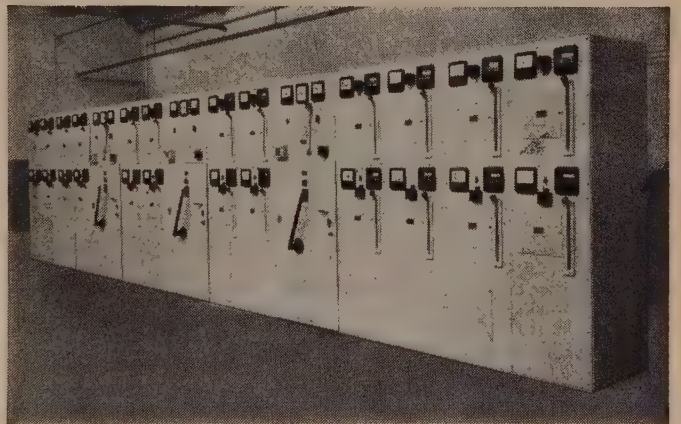
Telephone : Acocks Green 2931





## WHEREVER THERE'S POWER ... THERE'S DENNIS SWITCHGEAR

Dennis heavy duty medium voltage Switchboards are operating with the greatest efficiency all over the world, in tropical, temperate and cold climatic conditions, for the centralised control of all types of lighting, heating and power circuits. Combinations of fully tested H.R.C. Fused Switches to 800 amps. and Circuit Breakers to 2,000 amps. are designed to individual requirements and will always provide trouble-free operation, ease of maintenance, saving of space and symmetry of appearance. Dennis Switchgear gives complete satisfaction by offering an extensive range of H.R.C. and Rewireable Fused Switches, Distribution Boards and Fuses, made to the highest standards of electrical engineering practice, ensuring quality with economy.



**INDUSTRIAL SWITCHBOARDS**

An example of 440 volt main switchboard factory installation

### HEAVY DUTY FUSED SWITCHES

800 amps. TP and N  
Fused Switch, from  
our heavy duty 'CH'  
range (60 amp.—  
800 amp.) tested to  
50 MVA.



CH380N.

Ask for Catalogue M.C.4

# DENNIS

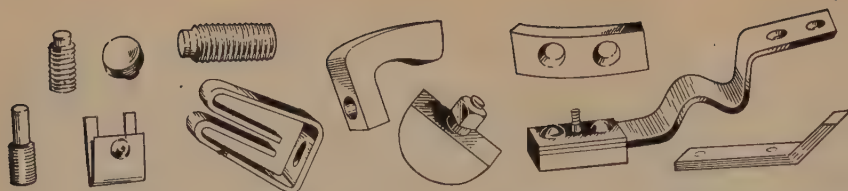
## SWITCHGEAR

**G. P. DENNIS LTD., SPEKE, LIVERPOOL 24** TELEPHONE: HUNTS CROSS 2241 (5 lines)

LONDON OFFICE AND SHOWROOM: 70 HIGH ROAD, CHISWICK, LONDON, W.4. (CHIswick 1486)

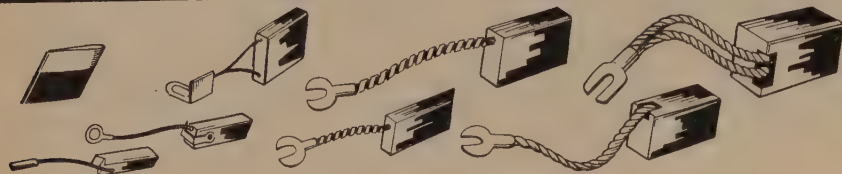
GLASGOW OFFICE: 125 WEST REGENT STREET, GLASGOW





## CONTACTS

In copper, brass, bimetal, silver, tungsten, phosphor bronze etc. Angles, rivets, tips, segments, contact springs. Any metal—any shape.



## CARBON BRUSHES

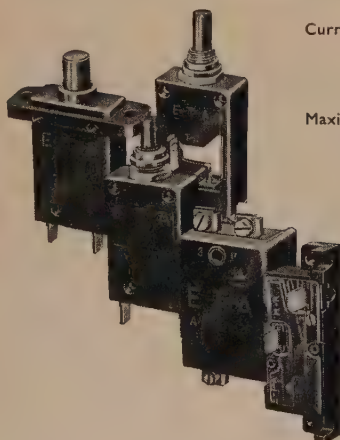
In all grades, shapes and sizes for every industrial purpose. Send old or new samples or drawings for keen prices and reliable service.

**PAXTONS (ELECTRICAL) LTD • WESTON-S-MARE**

**TEL: WESTON-SUPER-MARE 1357**

# E-T-A

## MINIATURE CIRCUIT BREAKERS AND OVERCURRENT PROTECTION RELAYS



Current Range  
Minimum 0.05 Amps.  
Maximum 30 Amps.

Maximum Voltage Rating  
250 V. A.C.  
24 V. D.C.

CIRCUIT BREAKERS  
THERMOSTATS  
MOTOR PROTECTION  
RELAYS  
TIME DELAY RELAYS  
ETC.

The above units are suitable for use with electrical and electronic equipment, telecommunication apparatus, small transformers, rectifiers, fractional H.P. motors, domestic appliances, etc., and are only part of our wide range of low voltage D.C., single phase A.C. and 3-phase breakers.

## TECHNA (SALES) LIMITED

47 • WHITEHALL • LONDON • S.W.1

TEL. WHITEHALL 1348/9

## MERCURY SWITCHES



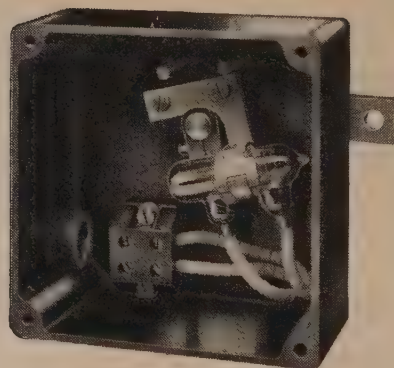
## MERCURY SWITCH UNITS



## MERCURY SWITCH RELAYS



CATALOGUE SENT ON REQUEST



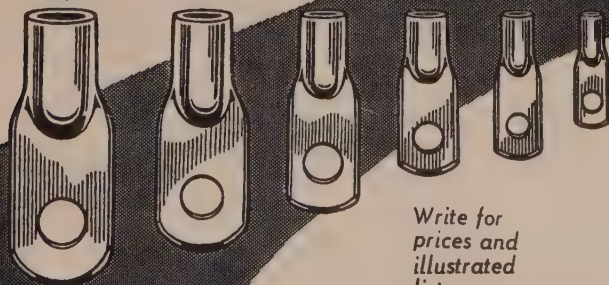
**I.A.C. LTD.**

Ref. ER, 10 CHASE ROAD  
LONDON, N.W.10

## COLD METAL PRESSINGS

## MANUFACTURERS

1,000 amps.



15 amps.

## COPPER TUBULAR CABLE SOCKETS

DIPPED TINNED

B.S.I. Type No. 91-1930  
No. 91-1954

X.L. Light Type

## EXCELALL METAL WORKERS LTD.

Phone:  
Victoria 0297

BIRMINGHAM 11

Grams:  
"Superpress"

Write for  
prices and  
illustrated  
list.



# No escape!



There's no escaping the fact that porcelain is the most widely used insulating material because it is safest, strongest and more durable under all conditions.

Wade electro-ceramics have an unsurpassed reputation for accuracy and reliability whatever their size, shape and purpose.

Wade technicians are at your service, your enquiries will receive immediate attention.

PORCELAIN FOR INSULATION . . . . WADE FOR PORCELAIN



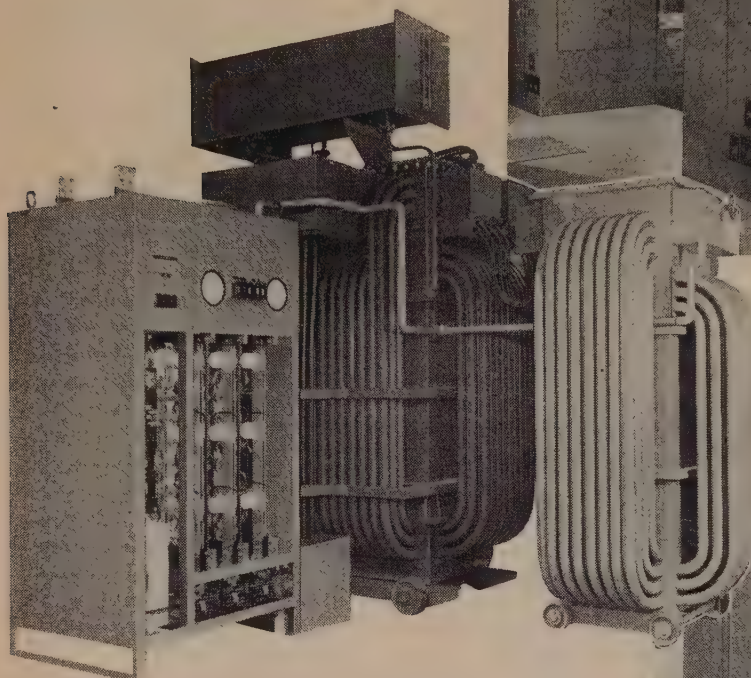
**WADE**  
ELECTRO - CERAMICS



# — RECTIFICATION —

## MERCURY ARC

A Mercury Arc Rectifier installation at the works of Western Chemicals Ltd., Alberta, providing an output of 12,000 amps at 510 volts D.C. for electrochemical duty.

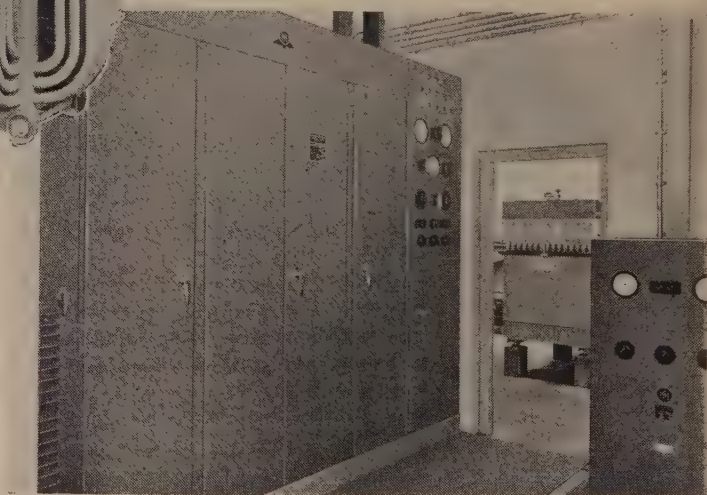


## SILICON

A 750 kW 3,000 amp forced air-cooled Silicon rectifier for electrolytic duty in Persia. A voltage regulator is included for voltage variation over the range 180/250 volts D.C.

## GERMANIUM

A 6,000 amp water-cooled Germanium rectifier providing a continuous output at 100 volts D.C. for an electrochemical process at the Luton Works of Laporte Industries Ltd.



# — MERCURY ARC OR SEMI-CONDUCTOR —

## HEWITTIC RECTIFIERS

**HACKBRIDGE & HEWITTIC ELECTRIC Co. Ltd.**

HERSHAM · WALTON-ON-THAMES · SURREY  
Telephone: Walton-on-Thames 28833 (8 lines)  
Telegrams & Cables: Electric Walton-on-Thames



**FOR YEARS OF RELIABLE SERVICE CHOOSE**

## RELAYS & CONTACTORS

We specialise in the manufacture of vital components for use in the automatic electrical control gear field.

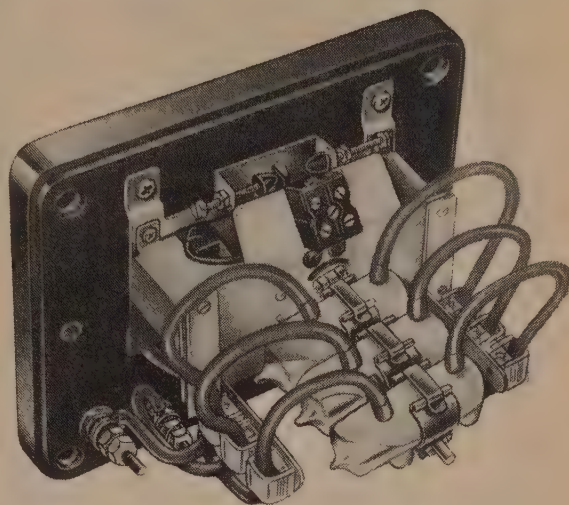
Heavy duty mercury contactors up to 200A are manufactured which can control heating loads in accordance with BSS.775 category A1.

In addition to heavy duty mercury switch contactors we manufacture three other ranges of Mercury Relays and several ranges of metallic relays for AC or DG operation.

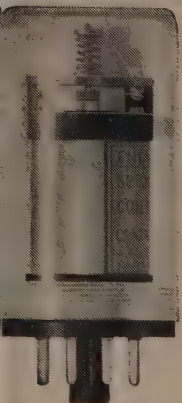
This equipment can be made to operate equipment automatically from changing temperature by using

it in association with our series of Temperature Sensitive Switches. These switches are made in many versions of pressurised variety which are not susceptible to vibration, have consistent operation and small differential.

FOR FULL INFORMATION  
PLEASE QUOTE E.R.3.



Mk. II 30A TRIPLE POLE CONTACTOR



Plug-in" double pole  
A changeover relay for  
AC or DC operation.



Ambient Sensing Roadstat  
for automatic road de-icing

# ENGEL & GIBBS LIMITED

ELSTREE WAY BOREHAM WOOD HERTS. Phone: ELSTREE 2291/4

## Lionel Robinson

& Co. Ltd.

DISTRIBUTORS  
OF



102  
Abbey  
Street  
Accrington  
Accrington 32774

47  
Museum  
Street  
Warrington  
Warrington 34391/2

161-163 Eldon Street  
Preston

Telephone—Preston 57975/6

4 Staple Inn  
London, W.C.1  
Telephone - - Holborn 6322

## TUNGSTEN CONTACTS



... AND  
ELECTRICAL CONTACTS  
OF EVERY DESCRIPTION  
MADE TO CUSTOMERS'  
OWN REQUIREMENTS

No quantity too  
large or too small  
Competitive prices  
Speedy Deliveries

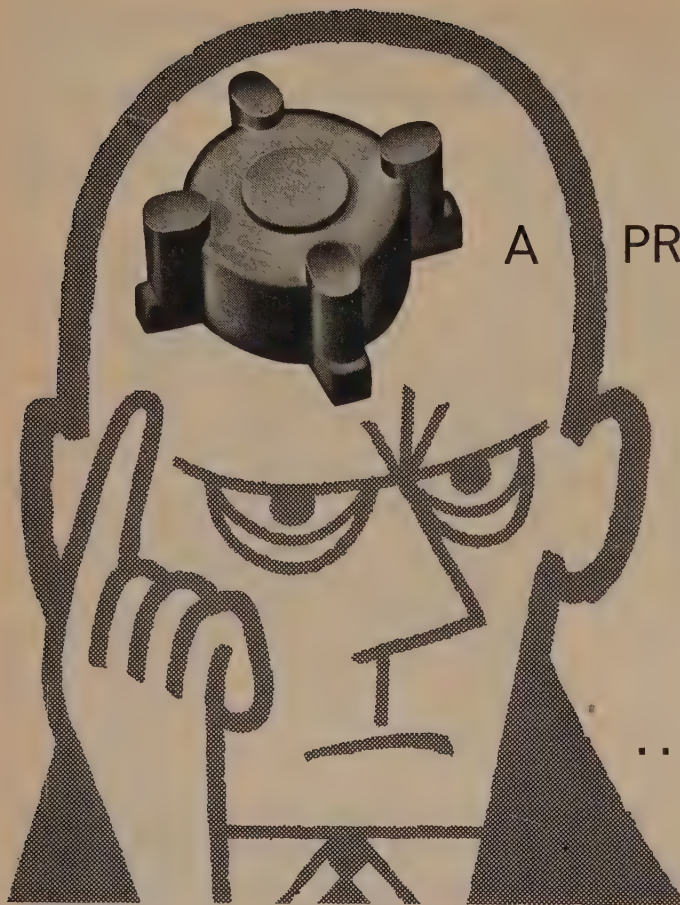
FOR FURTHER INFORMATION PLEASE WRITE TO:

## LLANDAFF ENGINEERING COMPANY

ELECTRICAL & MECHANICAL ENGINEERS  
HIGH STREET, LLANDAFF, CARDIFF.

Telephone 73241





## Have you A PRESSING PROBLEM?..

Accuracy, good finish, consistent high quality—these come naturally with Sutcliffe Speakman hot pressings and stampings. Machining can be undertaken to limits down to .0005". No quantity is too large, no job too complicated, no standard too exacting.

Pressings and stampings in non-ferrous alloys including aluminium, brass, chromium-copper, cadmium-copper, manganese bronze and nickel silver. Castings in gun-metal, phosphor bronze and heat-resisting nickel chrome alloys.

... ask

**SUTCLIFFE  
SPEAKMAN**

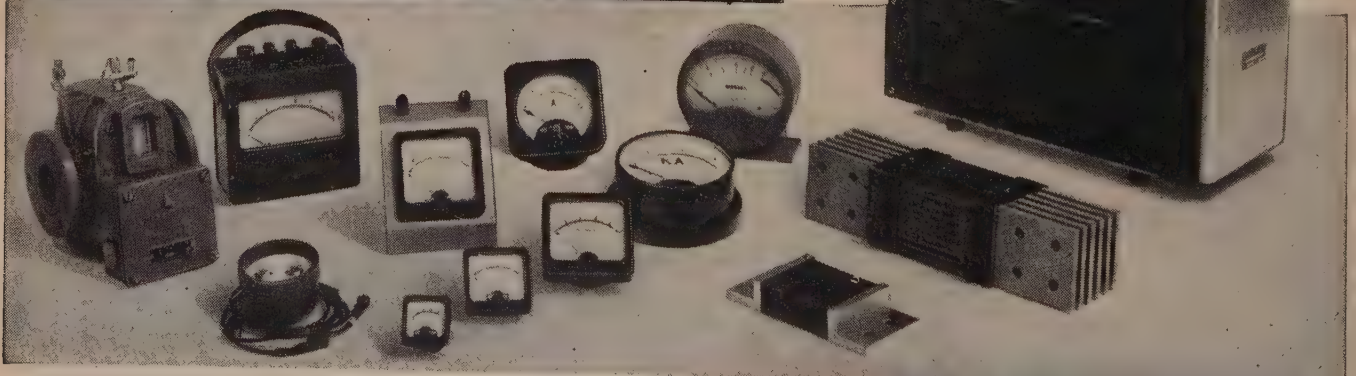
SUTCLIFFE SPEAKMAN & CO. LTD., Leigh, Lancs.

Tel: Leigh 72101 (5 lines)

London Office: 2 Caxton St., Westminster, S.W.1. Tel: Abbey 3085



## ELECTRICAL INDICATING INSTRUMENTS AND ASSOCIATED EQUIPMENT



Miniature, Switchboard and Portable Instruments. Moving Coil, Moving Iron and Rectifier Types. Micro-Ammeters, Milliammeters, Ammeters, Voltmeters, Frequency Meters and Phase Sequence Indicators. Educational Instruments.

Special Shunts. Transducers for the measurement of Heavy Direct Currents up to 20,000 amperes. Gas and Oil operated relays for Transformer Protection (Buchholz Principle). Oil operated relays for Tap Changer Protection.

**THE WEIR ELECTRICAL INSTRUMENT CO. LTD.**  
Head Office Bradford-on-Avon, Wiltshire  
and Works Tel: Bradford-on-Avon 2044/5.  
Sales Engineers in all areas.



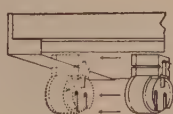
# A magnificent range of fluorescent fittings with many new features in design, finish and ease of installation

Atlas Atlantic 2 is a new range of fluorescent lighting fittings with many advantages over all others yet conceived. Using one basic spine, plus a minimum of attachments, a wide variety of fittings can be created to meet the precise lighting needs of almost any industrial, commercial or municipal installation. Appearance is superb, efficiency outstanding, finish immaculate; yet prices show savings up to 25% on previous designs.

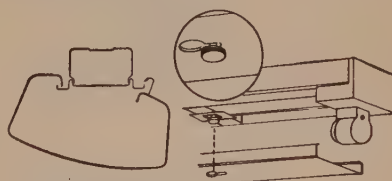


The AAB series diffusers illustrated, accommodating 1 or 2 x 80w. tubes, present economic, but very attractive, commercial lighting fittings. Extruded with a bold reeded pattern on the outside, the opal 'Diakon' diffuser has clip-in plastic moulded end plates in blue or white and is easy to clean. Price with QS gear for the twin version is £17.25 tax paid.

Incorporated in the spine are many features which will reduce installation and maintenance costs. These include: new, spring loaded lampholder, starter switches replaceable without dismantling, welded screw studs, single component spine, pre-wired, automatic continuous run alignment; drip and dust proof, closed back; 'Miracryl' finish; and others illustrated.



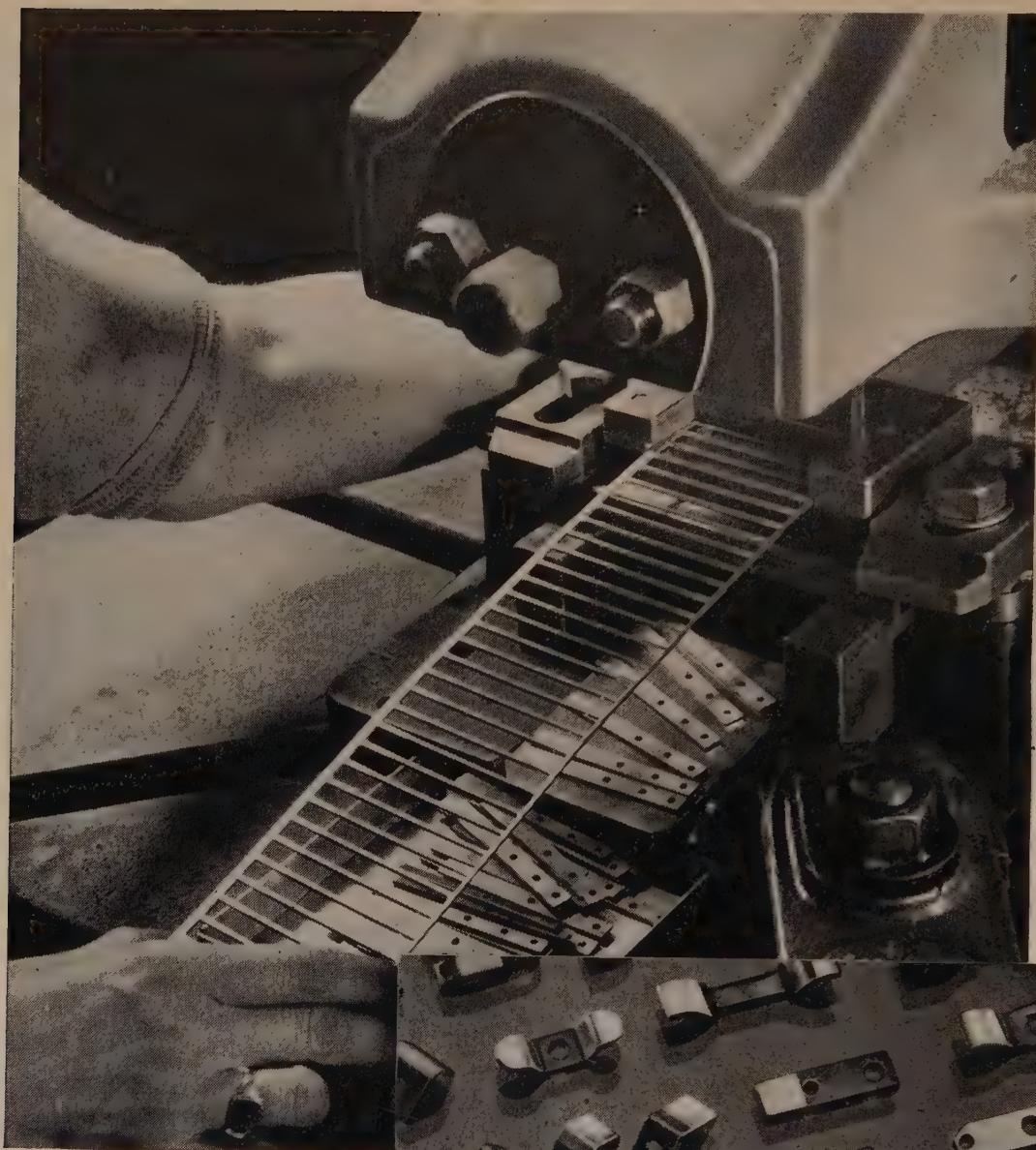
Improved lampholders,  
need no fixing, no  
screws



Fast, positive fixing of attachments

## atlas atlantic 2





a complete  
contact  
in one  
operation



JMC contact bi-metal consists of a noble metal contact material permanently bonded to a base metal backing — and a single press operation is often all that is needed to produce many types of contact parts.

In large-scale production, the use of bi-metal can offer big savings, both in noble metal and in labour costs.

Many forms of JMC contact bi-metal strip are supplied as well as finished bi-metal parts to the specific designs of users.

*One of the specialised products of*

**Johnson  Matthey**

*Write for full technical information.*

**JOHNSON, MATTHEY & CO., LIMITED, 73-83 HATTON GARDEN, LONDON, E.C.1.**  
Vittoria Street, Birmingham, 1. Telephone: Central 8004.

Telephone: Holborn 6969  
75-79 Eyre Street, Sheffield, 1. Telephone: 29212

HC3/229



# RELIABILITY

*The special quality of Magnetic Devices Relays which embraces*

\* **RELIABLE OPERATION AND PERFORMANCE**

\* **ACCURATE RESPONSE**

\* **LONG LIFE**

\* **UNRIVALLED TECHNICAL KNOW-HOW IN RELAY DESIGN**

Magnetic Devices manufacture a complete range of relays for every application in the electrical and electronic industries. Robust construction, proven reliability, versatility of contact arrangements—simple to re-arrange to customers' requirements.

The standard range includes enclosed, hermetically sealed, miniature, sub-miniature, plug-in, screw terminal and transistorised types; for A.C. or D.C. operation.

Special relays for prototype equipment can be supplied—consult our design engineers.

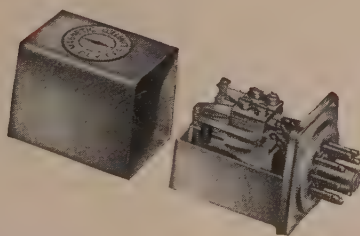
\* **WIDE RANGE**

\* **KEEN PRICES**

\* **SPEEDY DELIVERY**



*Series 336 Relay.* A new plug-in, sub-miniature sealed relay with double-changeover contacts capable of switching a 2-amp. resistive load at 28 v D.C., or 110 v A.C. Operates on 0.35 watt in 3 ms., releases in 2 ms.



*Series 596 HS Relay (Transistorised).* Hermetically sealed relay for control by ultra-sensitive contacts. For handling the loads of circuits such as heavy-duty contactors; solenoids, heaters, etc. Controlled by very light inputs.



*Series 592/597 Relay.* A new miniature relay specifically designed for use with printed circuits. All contact and coil connection spills coincide with the recommended standard of 0.1 inch grid. Can accommodate up to 4 changeover contacts in D.C. version or 3 in A.C. version. Single or double wound coil available.



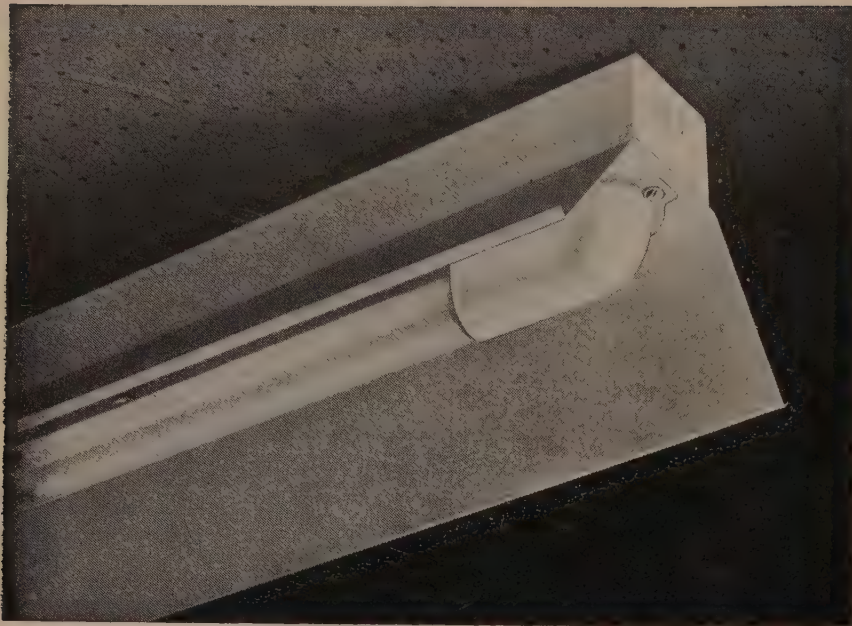
A.I.D. & A.R.B. APPROVED

## MAGNETIC DEVICES LTD

NEWMARKET ENGLAND TEL: NEWMARKET 3451 (10 LINES), GRAMS: MAGNETIC NEWMARKET

P5251





## fluorescent lighting fittings

THIS VERY COMPETITIVE FITTING COMBINES SIMPLICITY WITH EFFICIENCY AND HAS ALL THE FEATURES TO MEET MODERN INSTALLATION REQUIREMENTS

key-hole fixing slots    suspension loops provided • full length back plate • three cable entry positions • captive screws retain reflector • resin filled control gear • switch or instant start • lamp end covers quickly detachable • control gear guaranteed 3 yrs. • 3 pin plug & socket extra

OT501 **£4.7-6** switch start less lamp  
*fitting brochure sent on request*

# WADES (HALIFAX) limited

ARDEN WORKS • FENTON ROAD • HALIFAX • YORKSHIRE

TEL: HALIFAX 61637



Mi...ca?



Mica — from  
**DACIER**  
*of course!*

*We specialise in the production of parts from Natural Mica Block, especially for Stove Plates, Heater Elements, Washers, Compass Cards, Water Level Gauge Glass Protectors. We also supply parts machined from Micanite and Synthetic Laminated Bakelised Paper Materials and other Insulators*

DACIER LTD • 22 BARGATES • CHRISTCHURCH • HAMPSHIRE TELEPHONE CHRISTCHURCH 1011





## Aberdare Cables

*Aberdare Cables Ltd manufacture  
a comprehensive range of paper insulated and  
thermoplastic cables; to British Standard or  
foreign specifications as required.*





*The photographs show, above, the new bays at the Blackwood factory and, bottom left, the Transformer Factory at Treforest Trading Estate.*

The success of our research, designs, and manufacturing policy in the field of switchgear is clearly indicated by our continuous expansion and the confidence shown in S.W.S. products throughout the world. The fact that S.W.S. equipment is repeatedly 'first choice' confirms this confidence and an expanding organisation such as ours needs more space to meet the consequent ever-growing demand for our products. The current building programme includes factory and office extensions, a new research and laboratory block and a new transformer works.

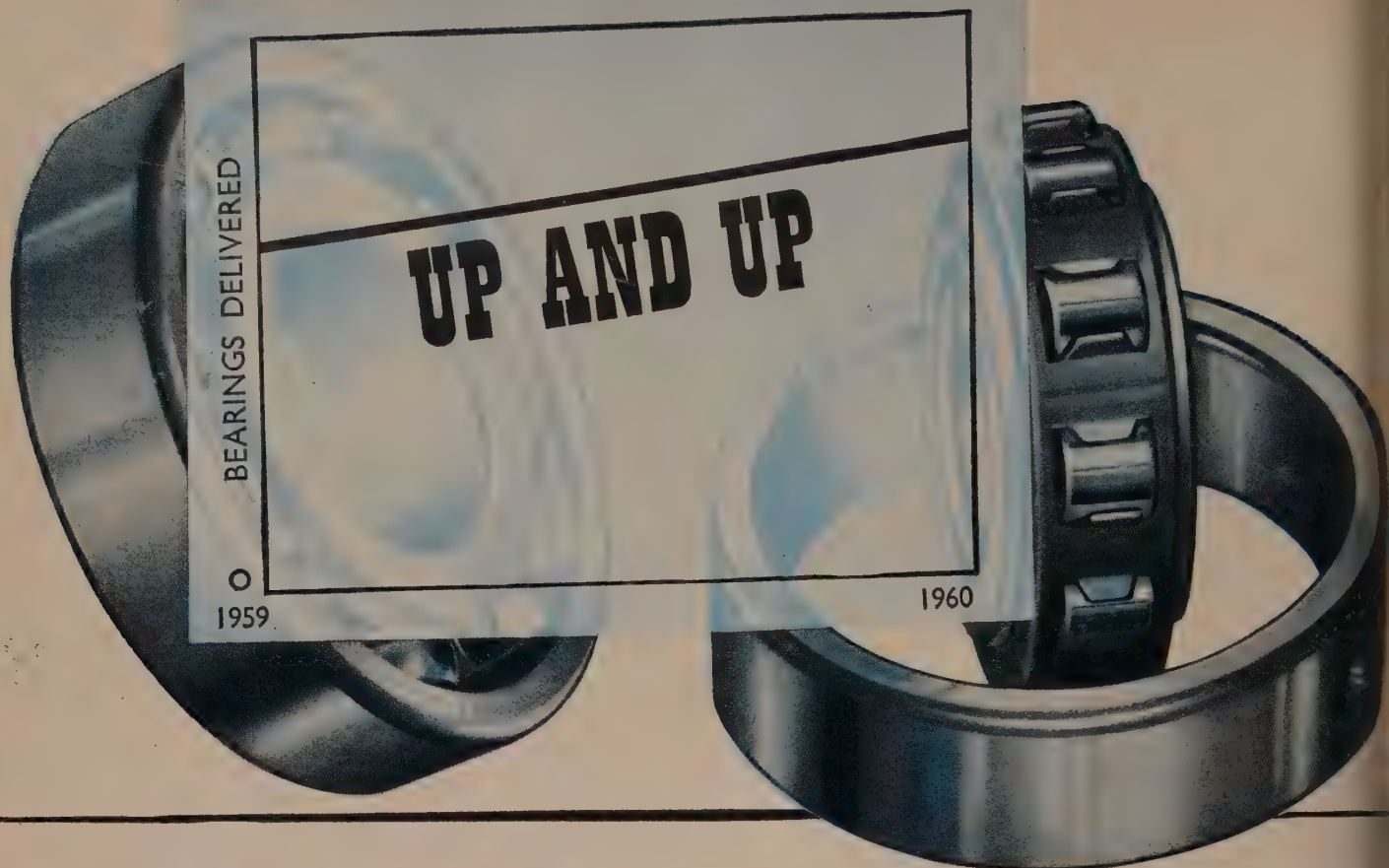


**SOUTH WALES SWITCHGEAR LIMITED**  
 BLACKWOOD • MONMOUTHSHIRE • WORKS AT TREFOREST AND BLACKWOOD  
 SWITCHGEAR • FUSE-SWITCHGEAR • TRANSFORMERS • CONTROL BOARDS









# HOW FBC ARE GROWING!

Last year F.B.C., with their augmented resources, their extended range of bearings and their reputation for quality, enjoyed a massive increase in the scope and volume of business.

F.B.C. have installed improved research facilities, and are building new factory extensions, confident in the continuance of the F.B.C. upward trend.

**FAFNIR BEARING COMPANY LTD., WOLVERHAMPTON**

REGD. TRADE MARKS: F.B.C., FAFNIR.

A Wide range  
*of*

BALL AND PARALLEL  
ROLLER BEARINGS

ALSO BEARINGS  
SUITABLE FOR  
HIGH SPEEDS,  
EXTRA QUIET BEARINGS  
AND SEALED  
PRE-LUBRICATED  
BEARINGS.

ALSO MINIATURE  
BEARINGS FOR  
INSTRUMENTS, ETC.

**F.B.C.**  
**FAFNIR**

A REPUTATION FOR FINE QUALITY

AN INCREASED RANGE OF BEARINGS

GREATLY AUGMENTED FACILITIES





## They take it for granted

Warmth at the flick of a switch. So quickly, so conveniently. And what an amazing diversity of choice. An electric fire to fit round, or an unobtrusive radiator; a small amount of heat or a large amount; which style, which colour, which price? There is sure to be a model which exactly fills the bill. Yet with all these questions, one point will probably be overlooked. What is the quality of the element? That won't matter provided it is made from Nichrome\* resistance wire. Over half a century's research and production techniques lie behind this alloy—and it has an international reputation for long life at high temperature.

For space-heating appliances (open, oil-filled, tubular, infra-red) Nichrome\* and Nichrome\* V are used for elements, BD-H bimetal for thermostats, and Drivex\* cables for leads.

Reg. Trade Mark

"Electrical Alloy Data" contains 84 pages of fundamental information concerning the use of electrical resistance alloys. Copies are available free of charge on request.



**BRITISH DRIVER-HARRIS CO LTD**

CHEADLE HEATH, STOCKPORT, CHESHIRE

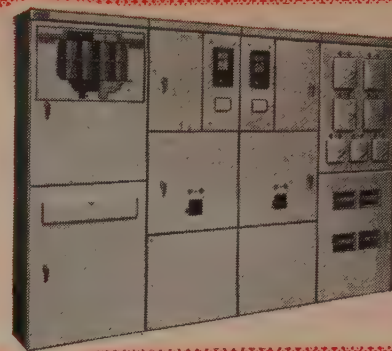


Simplex leadership stems from vast experience, sheer technical efficiency and a team of brilliant designers.

It is the blending of these merits that has produced superb ranges of switchgear.

Simplex Star, Regent and Monarch ranges, and S & S automatic control gear, along with circuit-breakers, etc., can be assembled to satisfy your needs for every industrial and commercial requirement.

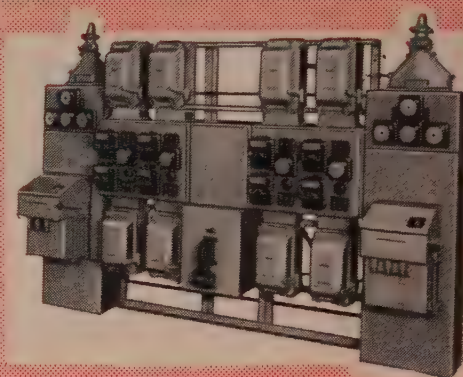
Simplex design service is always at your disposal from a simple switchboard to the most complicated made-to-measure task.



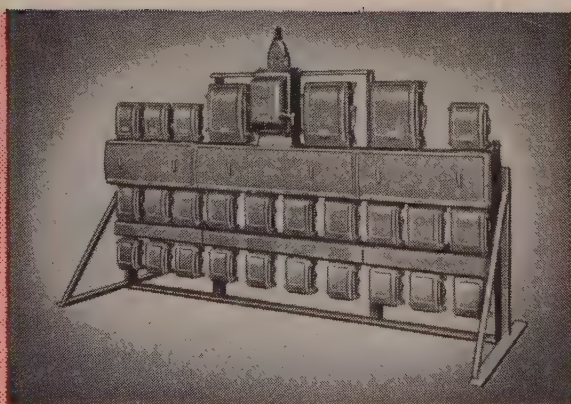
1



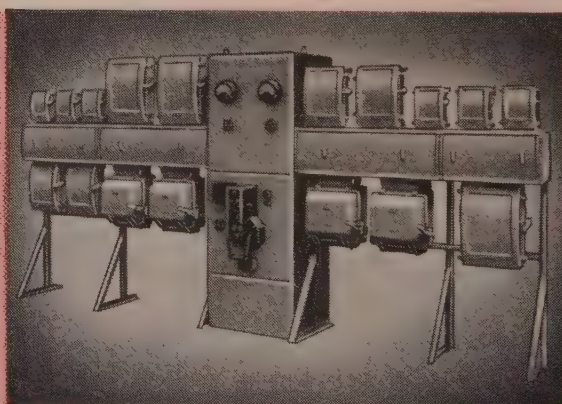
2



3



5

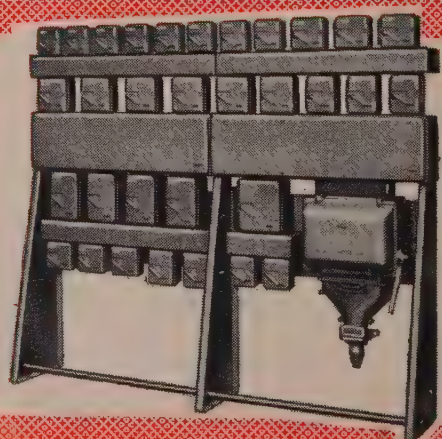


6

 ELECTRICAL DIVISION

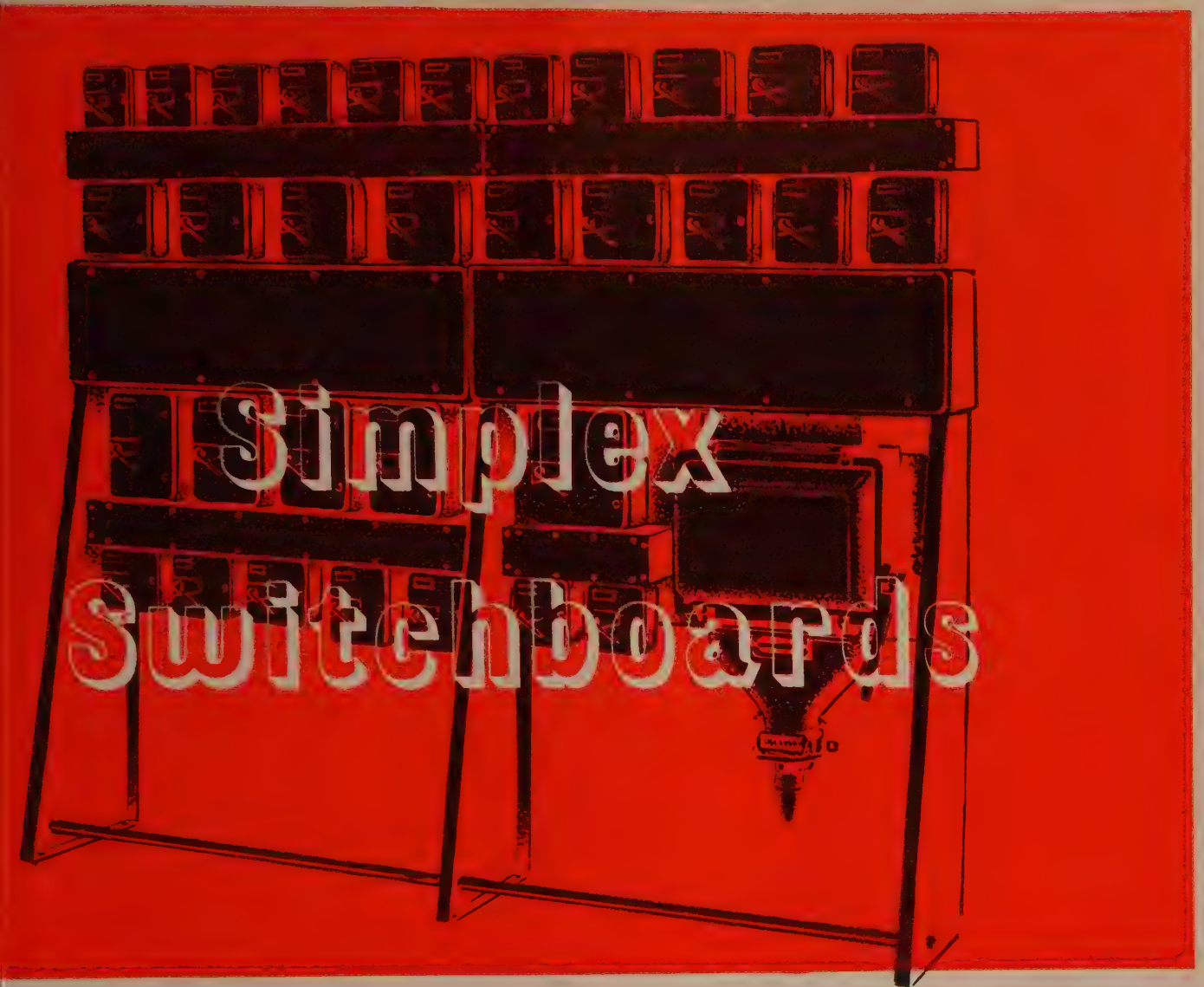
# Simplex

**SIMPLEX ELECTRIC COMPANY LIMITED**  
**CREDA WORKS, BLYTHE BRIDGE, STOKE-ON-TRENT, STAFFS.**  
 Branches throughout Great Britain and Agents throughout the World

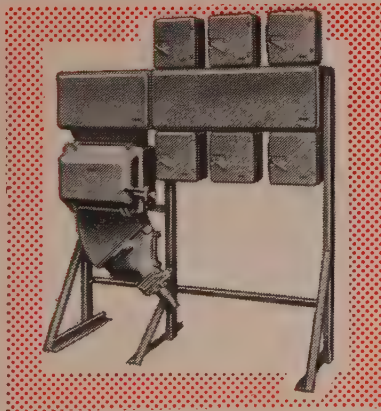


4





8



9



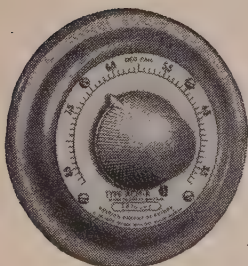
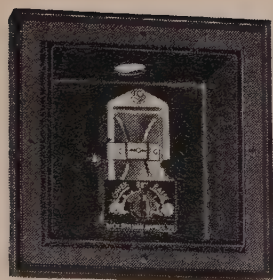
- 1 Cream coloured cubicle type Switchboard, incorporating mimic diagram of floor-warming circuits, made up of Star and S & S installation switches controlling all electrical services at a dock's reception area.
- 2 Star Monarch and Automatic Control Gear switchboard designed to control all services (and Floor-warming) for a Comprehensive School, Menai.
- 3 Specially designed switchboard incorporating Monarch units supplied to a Gas Board.
- 4 Multi-tier Star switchboard with incoming Monarch unit controlling kitchen in a Commercial Building, Birmingham.

- 5 Multi-tier Regent switchboard with Monarch incoming unit for an International Airport.
- 6 Switchboard built up with Regent and Monarch units designed for a Bristol Factory.
- 7 Busbar mounted multi-motor starter-board for an oil refinery.
- 8 Star switchboard with Monarch incoming unit (with angled sealing chamber) supplied to a factory.
- 9 Multi-motor control cubicle for an oil storage installation, London.





Trust a Maclaren!



Yes! Trust a MACLAREN for Control Precision. For UNDER FLOOR WARMING we have designed a complete Control System based on unrivalled experience in this field. The MACLAREN Thermo-Time Regulator, ACMR Room Thermostat, and MC-W Floor Thermostat combine to provide a precise temperature-time programme—the desired temperature at the scheduled time. Remove all guesswork from your UNDER FLOOR WARMING problem by specifying the Control System you can trust—it's a MACLAREN!

**"MACLAREN"**

**ELECTRIC THERMOSTATS**

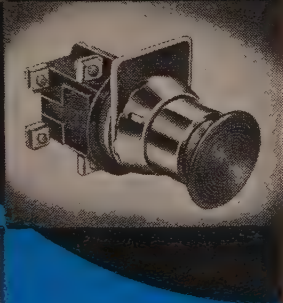
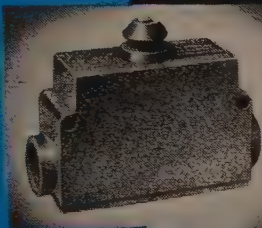
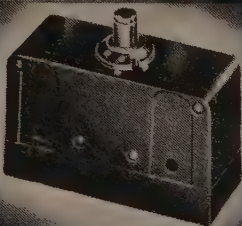
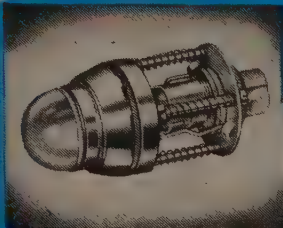
**ROBERT MACLAREN & CO. LTD., EGLINTON WORKS, KILBIRNIE STREET, GLASGOW, C.5**

London Office: 75 George Street, Portman Square, W.1. Manchester Office: 120/126 Portland Street, Manchester 1. Midlands Office: 61 Bridge Street, Walsall





for industrial control devices ...



- LIMIT SWITCHES
- INDICATOR LIGHTS
- MINISWITCHES
- METALCLAD MINISWITCHES
- PUSH BUTTONS
- ROTARY SWITCHES



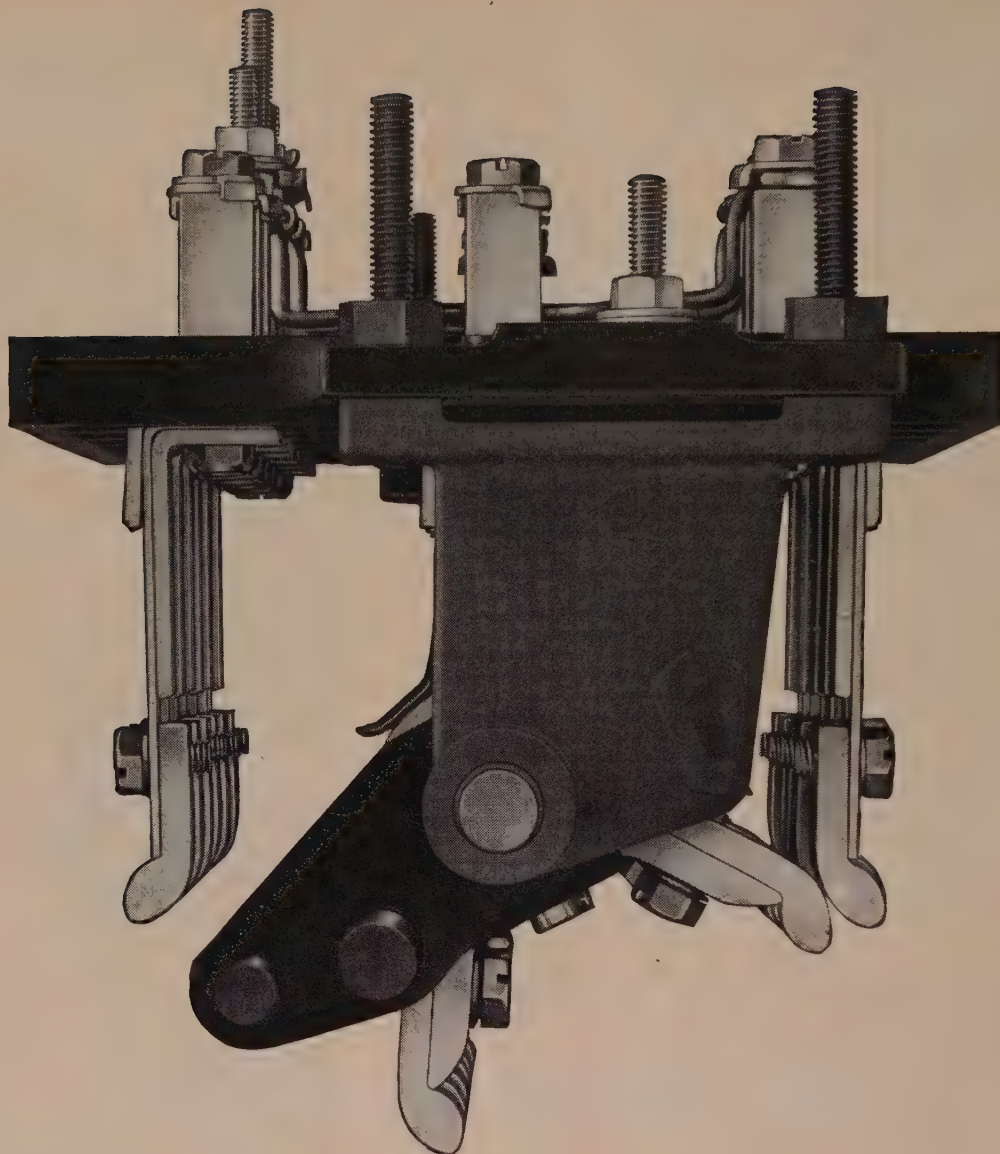
... consult

**CRAIG & DERRICOTT**  
LIMITED

Telephone: SUTTON Coldfield 7716-7-8

ROYAL WORKS, SUTTON COLDFIELD





## Take a **new** view of **Ellison**

Whichever way you look at it, this contact mechanism for an "Ellison" Star-delta Starter represents a minor masterpiece of engineering. It mirrors that striving towards perfection so evident in every component that goes into the making of Ellison Switchgear.

Ellison Switchgear is manufactured to a standard not a price, in the honest belief that this is the only way of manufacturing completely reliable switchgear. Ellisons have been long enough in the business to know what they're talking about. Their formula? ...Traditional

skill, modern production methods and over half a century of specialised engineering knowledge. Add to this, bold and dynamic design that will still be ahead of its time in the next half century and you will understand why Ellison Switchgear is the finest in the World.



# ELLISON SWITCHGEAR

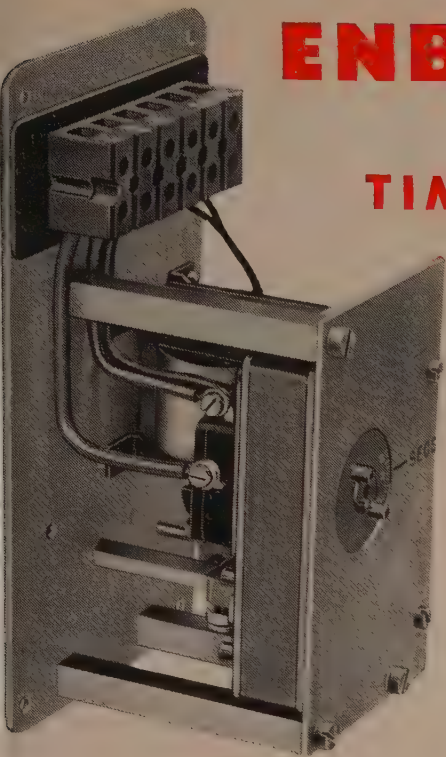
—for complete reliability

GEORGE ELLISON LIMITED • PERRY BARR • BIRMINGHAM 22B



# ENBRAY Relays

## TYPE 8R TIME DELAY RELAY



A compact general purpose Time Delay Relay, incorporating a Swiss made Relhor precision escapement mechanism and an operating solenoid.

The solenoid, when energised, loads the internal springs of the Movement and the self-starting escapement commences the delay period, at the end of which a single pole change-over micro-switch is operated.

A dial on the front of the instrument enables the delay period to be preset over a range of approximately 20-1, and escapement mechanisms giving maximum times of 10, 60, 120, 180 or 300 seconds can be provided.

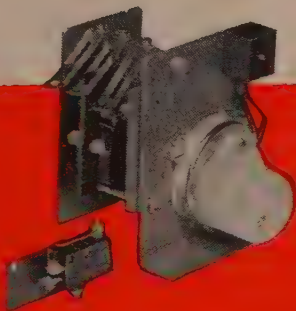
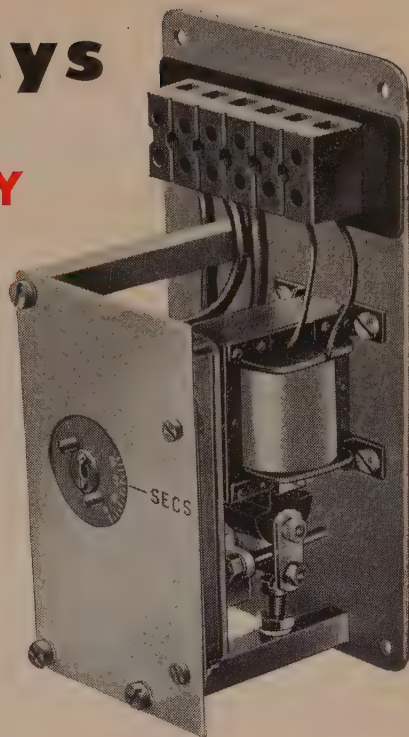
Tests have shown that the repeat accuracy of the time delay is of a high order and the life of the movement is in excess of a million operations.

If required, an additional instantaneous micro-switch can be provided.

The unit is available for A.C. or D.C. operation and with time delay on energising or de-energising the coil.

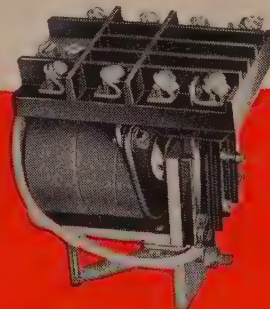
Relays for standard voltages and times are available ex stock.

Special variations are available on short delivery.

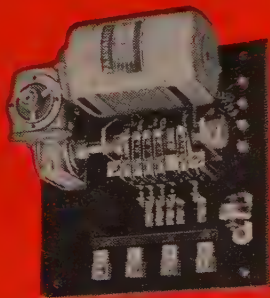


Three-Cam Timer  
showing easy switch removal

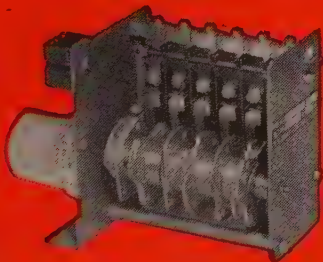
### OTHER TYPES OF TIME DELAY RELAYS



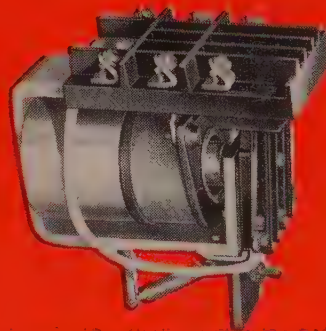
Type 8X222-2 Precision Time  
Delay Relay



Cam Timer for D.C. Operation



Six-Cam A.C. Timer



Type 8V120-2 Precision Relay  
with Time Delay by copper slug

MAKERS OF QUALITY CONTROL GEAR FOR NEARLY FORTY YEARS

# ENB E. N. BRAY LTD ENB

Head Office and Works, Britannia Road, Waltham Cross, Herts.

Telephone: Waltham Cross 22912-5

Branches: Glasgow: 190 West George Street, Glasgow, C.2.

Manchester: Canada Chambers, 36 Spring Gardens, Manchester 2.

Birmingham: 19 Darnel Hurst Road, Little Sutton, Sutton Coldfield.

London and South: Apply Head Office.

Telephone: Douglas 1271

Telephone: Blackfriars 4791

Telephone: Four Oaks 2185



For  
really tough  
insulation  
jobs...



## P & B TAPE

P & B Tape is used wherever exceptional resistance to abrasion is essential—in mines, power houses, transformer stations, telegraph and telephone installations. It far exceeds the requirements of the British Standard (No. 1078/1954), gives complete insulation. When you need the *supreme* heavy duty insulating tape, use P & B. In any width from  $\frac{1}{2}$  inch.

Manufactured by

# RUBEROID

For full details, write or phone:

**THE RUBEROID COMPANY LIMITED,**

56A COMMONWEALTH HOUSE • 1-19 NEW OXFORD STREET • LONDON W.C.1

TELEPHONE: HOLBORN 8797 AND 9501

P6807

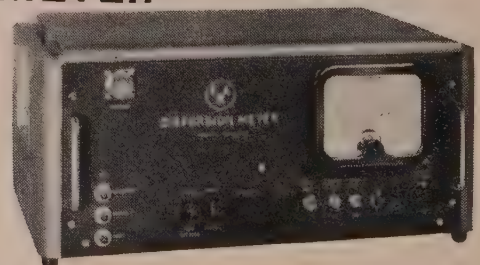


## E.R.A. DISCHARGE DETECTOR

If you are concerned with research or the manufacture of cables, transformers, capacitors, dielectric materials, insulating materials, electric motors, switch-gear, electronic components etc.

**these instruments  
are important to you!**

## E.R.A. DISPERSION METER



**CONTACT US FOR FULL DETAILS NOW!**



**F. C. ROBINSON &  
PARTNERS LIMITED**

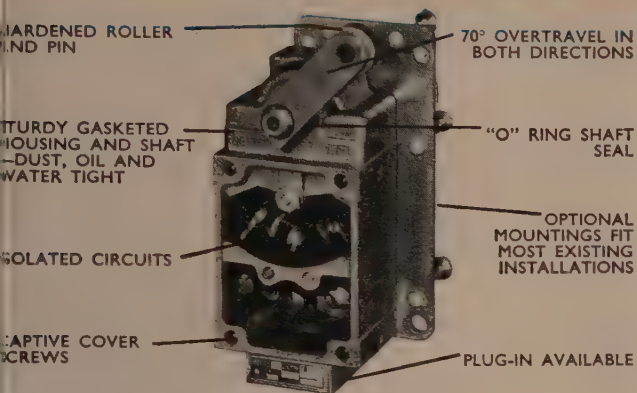
*Specialists in Instrumentation*  
Councillor Lane, Cheadle, Cheshire  
Telephone: GATley 2469/4020



# DENISON

## LOXSWITCH

### MODEL L heavy duty



**HIGH CONTACT PRESSURE** Twice as much contact pressure.

**LONG CONTACT LIFE** Lowest impact, minimum "bounce". Weight of contact units (mass at impact) 2.45 grams.

**70° SAFETY OVERTRAVEL**

**WATER, DUST AND OIL TIGHT**

**MEDIUM OPERATING FORCE** Greatly reduced wear.

**SIMPLICITY OF DESIGN** Ease of maintenance, few working parts.

**INTERCHANGEABILITY** Switch mountings and levers fit most existing installations.

**LEVERS** 150 levers available.

**15 CONTACT ARRANGEMENTS**

AMPERE RATINGS

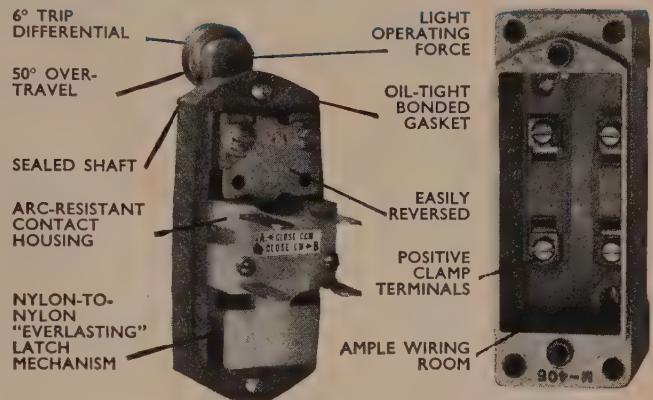
	Normal		Inrush
VOLTS	AC	DC	AC
125	30	5	60
250	15	2	30
Three circuit switches rated to 300 volts only			
Two circuit switches rated to 600 volts			
500	7.5		15
600	6	.4	12



### STANDARD OF RELIABILITY

*in limit switches for machine tools and handling equipment*

### MODEL M precision



**LONG MECHANICAL LIFE** Heavy duty nylon latch mechanism. Tested to 45,000,000 cycles under electrical load.

**WIDE CONTACT GAP**

**FULLY ISOLATED CIRCUITS** Positive double break, 1-NO, 1-NC.

**50° OVERTRAVEL** In both directions, only 6° trip differential.

**MANY LEVER STYLES** Wide choice for maximum adaptability.

**PLUG-IN MODELS**

AMPERE RATINGS

	Normal		Inrush
VOLTS	AC	DC	AC
125	20	3	60
250	15	1.5	30
500	7.5		15
600	6	.4	12

\* Registered trade mark of R.B. Denison Manufacturing Co. U.S.A.

Send for the **LOXSWITCH** leaflet

## EXPERT

### INDUSTRIAL CONTROLS LIMITED

Lount Works

Ashby-de-la-Zouch

Leicestershire

Telephone: Ashby 422/3



## Cast Basalt

is the material best resisting abrasion and corrosion.

Installations with applied basalt castings are indispensable for conduits transporting hard and coarse materials such as coal, coke, ashes, clinker, ore, cement etc.

Cast basalt is more abrasion resisting than manganese steel.

it resists acids,

saves maintenance costs,

increases production,

prevents production stops and improves

cleanness of operation.

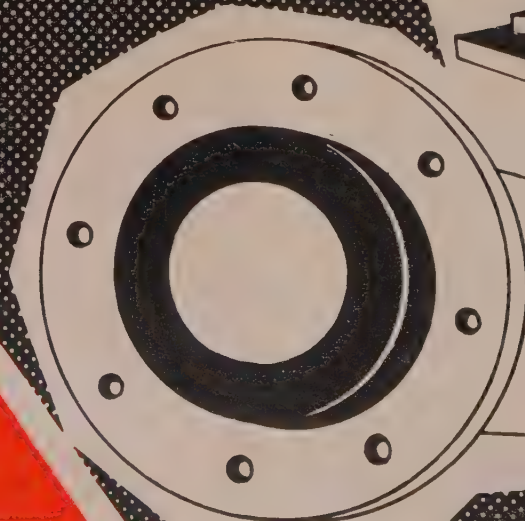
**Sole concessionaires:**

**Cast Basalt Products Ltd.,**

**Glebe House, Hollin Lane,**

**Leeds 16.**

**Tel: 54131.**



Offers, projects, prospectuses.

**CZECHOSLOVAK CERAMICS**

**Prague 1, Jáma 1, Czechoslovakia**

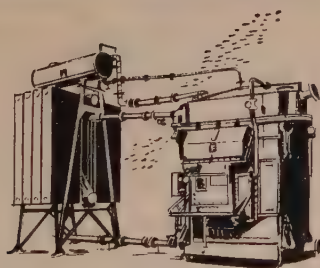
**P. O. B. 753.**



# keep in step



..... with the Ferranti system for  
parallel control of transformers



Supply Engineers are aware of the importance of transformers, operating in parallel, keeping in step with each other.

The schemes developed by Ferranti for parallel control of transformers dispense with complicated circuitry involving all auxiliary relays and accurately matched components, and provide a degree of reliability not previously achieved. Full details will be supplied on request.

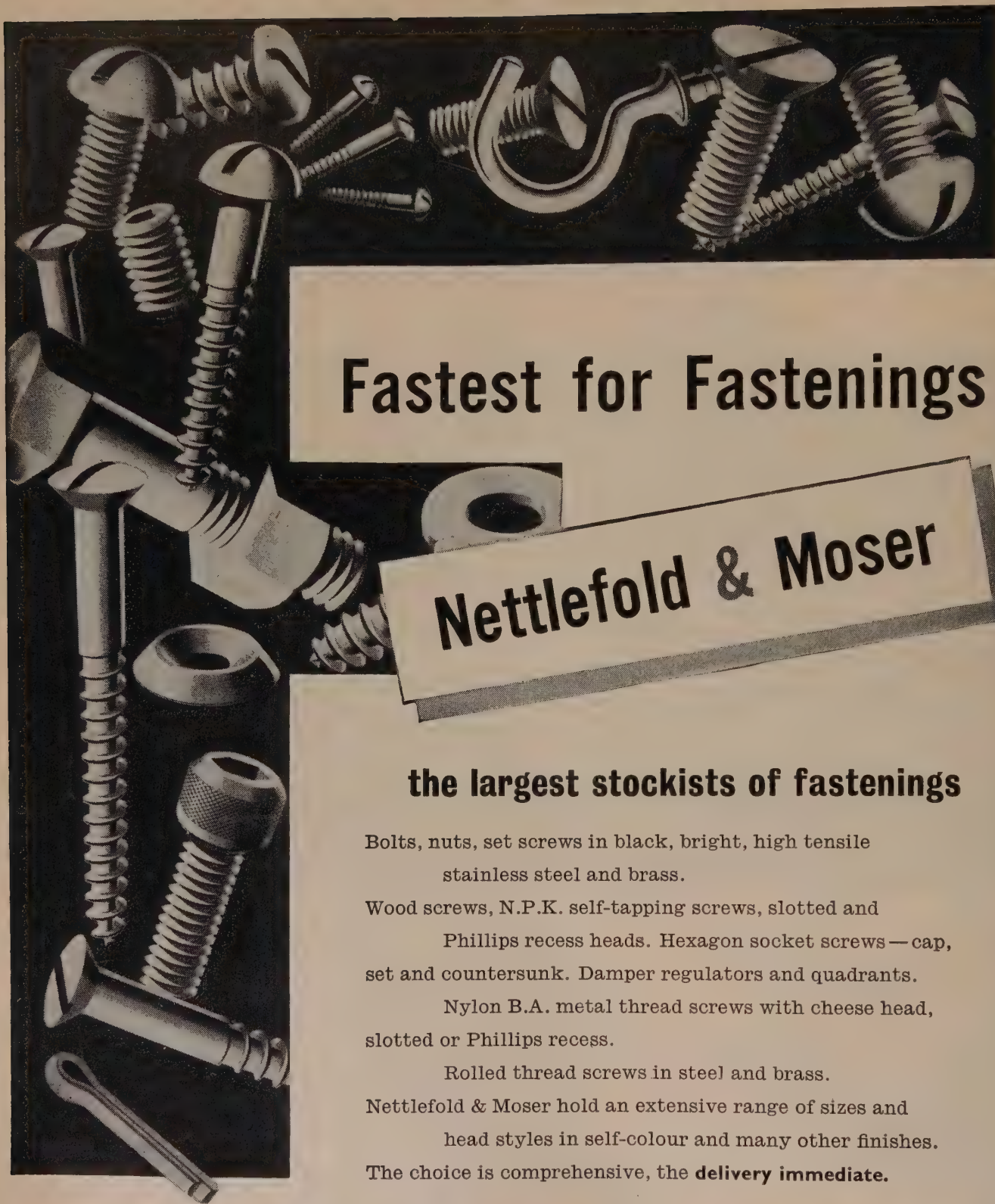
FERRANTI LTD • HOLLINWOOD • LANCs. Telephone: FALLsworth 2000  
London Office: KERN HOUSE, 36 KINGSWAY, W.C.2. Telephone: TEMple Bar 6666

## **FERRANTI**

### **FIRST INTO THE FUTURE**

FT 267/2





# Fastest for Fastenings

## Nettlefold & Moser

### the largest stockists of fastenings

Bolts, nuts, set screws in black, bright, high tensile stainless steel and brass.

Wood screws, N.P.K. self-tapping screws, slotted and Phillips recess heads. Hexagon socket screws — cap, set and countersunk. Damper regulators and quadrants.

Nylon B.A. metal thread screws with cheese head, slotted or Phillips recess.

Rolled thread screws in steel and brass.

Nettlefold & Moser hold an extensive range of sizes and head styles in self-colour and many other finishes.

The choice is comprehensive, the **delivery immediate**.

*You save time by ringing*

**Nettlefold & Moser**

*first*

**NETTLEFOLD & MOSER LTD**

LONDON: BOX 378, 170/194 BOROUGH HIGH STREET, SE1 • TEL: HOP 7111 (40 LINES)  
 BOOTLE: DUNNINGS BRIDGE ROAD, BOOTLE 10, LANCs • TEL: AINTREE 4171 (6 LINES)  
 HULL: 201 SCULCOATES LANE • TEL: HULL 41341 (3 LINES)



Eighty-Ninth Year of Publication

*Managing Editor:*

HUGH S. POCOCK, M.I.E.E.

*General Editor:*

J. H. COSENS

*Technical Editor:*

A. R. POLLARD, A.M.I.E.E.

Iliffe Electrical Publications Ltd

Managing Director H. S. Pocock, M.I.E.E.

Dorset House Stamford Street London SE1

Telephone Waterloo 3333

Telegrams Elecrev London-SE1 Code ABC

Please address correspondence to Editor, Advertisement Manager, or Publisher, as appropriate. Published weekly (Fridays). Registered at the General Post Office as a Newspaper. Entered as Second Class Matter at the New York, U.S.A., Post Office. Price: 1s 6d per copy. Annual Subscription: Home £4 0s 0d; Overseas £5 15s 0d; U.S.A. and Canada \$16.00. Remittances payable to "Electrical Review."

© Iliffe Electrical Publications Ltd. 1961. Permission in writing from the Editor must first be obtained before letterpress or illustrations are reproduced from this journal. Brief abstracts or comments are allowed provided acknowledgment to the journal is given.

# ELECTRICAL REVIEW

Friday 12 May 1961 Volume 168 No 19

## IN THIS ISSUE

### 815 Computer Operation

It is suggested that the problem of technical training applies not only to the recently qualified but also to the experienced engineer. There is a need for more and better-attended practical courses and new techniques

### 817 Axial Forces in Transformer Windings

Mr. P. R. Vein, of the Electrical Research Association, analyses some of the complications which can arise in the calculation of these forces

### 823 Hanover Fair

In this description of some of the outstanding exhibits at this year's exhibition, and the business prospects, the need for fuller British participation in the electrical section is emphasised

### 827 Norway's Growing Interest in Exports

The chairman of the National Association of the Electro-technical Industry, Mr. Aage Snilsberg, shows that the rapid exploitation of Norwegian water power since the war has been accompanied by a continuously increasing production of electrical equipment

### 831 E.D.A. Report and Luncheon

The annual report of the British Electrical Development Association reviews the effective sales campaigns organised during 1960. Despite the re-imposition of credit restrictions, there was a record demand for electric water heaters and cookers

### 846 E.A.W. Conference

The formation of sixteen new branches in 1960—the highest number yet—was recorded in the annual report of the Electrical Association for Women presented by the director, Miss Mary George, at last week's conference in London

### 853 Fisheries Research Vessel

Electrical equipment in the Ministry of Agriculture, Fisheries and Food vessel *Clione*, a large part of the main deck of which is devoted to laboratories

## NEWS SECTIONS

821 Views on the News  
822 Letters to the Editor  
830 Dounreay Hold-up Cleared  
833 Personal and Social  
836 Industrial News  
843 E.R.A. Luncheon  
844 New Electrical Equipment  
848 Financial Section

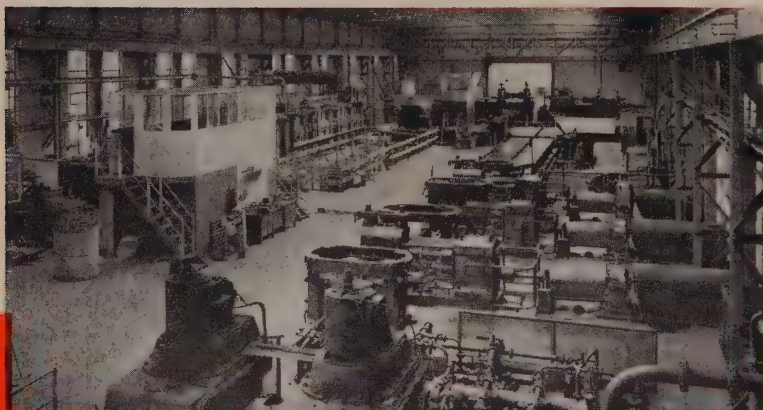
852 Parliamentary Report  
854 New Patents  
855 Next Week's Events  
856 Contract Information  
103 REGIONAL GUIDE TO ELECTRICAL CONTRACTORS  
107 CLASSIFIED ADVERTISEMENTS  
122 INDEX TO ADVERTISERS





# drawn to a fine art

Rods from our modern copper rolling mill provide wire, strip and strand for an endless number of electrical applications.



FREDERICK SMITH  
AND COMPANY  
ANACONDA WORKS  
SALFORD 3  
LANCS





# ELECTRICAL REVIEW

12 May 1961      Vol. 168      No. 19      Established 1872

## *Computer Operation*

**A**DEQUATE technical training facilities is one of the main questions facing the engineering profession today. It is not one of the easiest problems to deal with. A "group" solution has been suggested, but it is being implemented only on a very small scale.

Generally, technical training follows academic studies and usually involves experience in the use of engineering tools from lathes to radar. Having completed his apprenticeship the engineer never again has the chance to make a personal assessment of a wide variety of tools. When a new tool is introduced he may read about its principles and may even see it in operation, but he will probably be unable to obtain first-hand experience of its capabilities by personal operation. Thus, there seems to be a case not only for adequate training facilities for graduates, but also for engineers of all ages to help them keep abreast of technical progress, which may, if they were only able to realise it, help them in their particular work.

A good example is the relatively recent introduction of automatic electronic data processing systems with a computer as the main central item of equipment. The majority of our readers no doubt have some knowledge of the principles of the operation of a computer but only a few have actually "programmed" and operated a complete system. Having seen demonstrations of some of the intricate tasks undertaken by a computer, one may imagine that the art of programming and operating a complete data processing system can only be carried out by specialists. This is the case in only about 10 per cent of normal day-to-day work, but by using the simple code of the machine, the ordinary engineer can be taught to programme and operate a digital computer in a few days.

Programmes can be written in basic ("normal" or "machine") code or in simple code. In basic code there may be about 30,000 different instructions, while simple code consists of only a hundred or so. Both these codes depend upon the design of the computer and simple code is, in itself, a programme in basic code, which is usually stored in the "memory" system. If basic code is being used for a particular problem and the whole capacity of the memory is required, the simple code can be erased. To replace the simple code a standard set of programme cards or tape is fed into the machine. Normally, however, simple code remains in the computer's memory for months at a time.

Simple code programming is not a difficult task. The main difficulty is the breaking down of a complicated problem into simple mathematical terms. The designation "programmer" is, in fact, a misnomer. These



highly intelligent people are employed essentially to translate problems into simple mathematics. The actual programme writing can then be carried out by almost anyone.

Many preconceived ideas are found to be incorrect or require alteration when practical experience of a new technique has been obtained. Courses are available in many new techniques, but we feel that they are not sufficiently well attended. Many companies would find that it would be to their advantage to send more of their engineers to these courses, preferably those run by technical colleges, which do not have a bias toward any particular manufacturer's equipment.

### CO-OPERATIVE RESEARCH

The electrical industry is probably more conscious of the value of research than any other single industry in this country. This was stressed by all the speakers at the annual luncheon of the British Electrical and Allied Industries Research Association in London last week. The E.R.A. does a great deal of valuable research work which is widely recognised, but it has never had the full financial support that it deserves. This may possibly be due to the way in which the Association is organised and at last week's luncheon Mr. O. W. Humphreys, who is chairman of the E.R.A. Council, suggested that a drastic overhaul of the administration of the Association was urgently necessary if it was to maintain its high reputation and expand the facilities with which it provided industry.

In terms of the research resources deployed in the electrical industry the E.R.A. is not a large organisation. Within the industry there is an increasing awareness of the need for collaboration in research and if the E.R.A. could only attract to itself a small proportion of the projects on which firms wish to work together then its financial problems would largely disappear.

### NUCLEAR LOSSES

Most of the companies involved in the erection of the first commercial nuclear power stations have had to make provision for losses on their contracts. The latest are Babcock & Wilcox, Ltd. In the annual report the chairman, Sir Kenneth Hague, says that losses amounting to £650,000 were incurred last year on the Hinkley Point and Trawsfynydd stations and provision has been made for a possible further loss of £700,000. Sir Kenneth attributes the position to the exceptional cost of the development work necessary in this new field and to "unprecedented labour problems at site" which were largely outside the company's control.

Little is known of the conditions of contract for the nuclear power stations. On the face of things it seems hard that the pioneers in this comparatively unknown branch of power generation should incur heavy losses. It was originally thought that the valuable experience which they gained would enable them to take on overseas contracts from which they could recoup possible losses on the British stations. So far only two of the

groups have secured such contracts and the prospects of further overseas business are not too bright. Possibly potential customers are awaiting results from the operation of the first stations, but in the meantime progress is being made on other than "Calder Hall" type reactors.

### EMERGENCY POWER

One of the essential features of a nuclear reactor safety system is the provision of an emergency power supply which must be arranged to take over immediately should the main electricity supplies to such vital parts as pumps, blowers or controls fail, or be cut off by a reactor shut-down. Usually, emergency power is provided from generators driven by internal combustion engines. These are started automatically on failure of the normal electricity supply by compressed air released from storage vessels.

Up to the present time, engine starting arrangements have tended to become somewhat complicated, thus introducing an element of uncertainty in regard to the completion of the operational sequence. A simple device designed at the Risley establishment of the United Kingdom Atomic Energy Authority, and now in use at Dounreay and Windscale, consists mainly of a single valve controlling the admission of compressed air to the engine. The valve is normally closed and is opened by a falling weight which, until an electrical power failure occurs, is held suspended by an energised solenoid. When the engine has started, the pressure of oil in its main lubricating system shuts the valve and at the same time latches the operating weight in the original position ready for the next start.

### QUALITY AND PRICE

The reputation that manufacturers in this country have for producing goods of superior quality is a valuable asset. This was made abundantly clear in talks with British exhibitors at the recent Hanover Fair. But quality can be achieved at too high a price. Concentration on strength and durability may involve a wasteful use of materials. Attention should also be given to suitability for purpose and design must be flexible in the face of world competition so that high standards are maintained at minimal cost.

This problem has been raised again by the F.B.I. delegation which Sir William McFadzean led to Spain. They point out that in some cases the stringent requirements of the C.E.G.B. are the cause of British prices being too high. They rightly do not advocate a lowering of standards but suggest that it is worth while examining how far we could "drop our sights as the continentals do to meet the price demand, while still manufacturing above the minimum standard requirements." But building to different standards in the same works also increases costs. There is at least some onus on supply authorities to keep their standards under constant review so that manufacturers are not placed at too great a disadvantage overseas.



# AXIAL FORCES IN TRANSFORMER WINDINGS

By P. R. VEIN, B.Sc.\*

An individual turn of a transformer winding through which a current is passing may experience two kinds of force: that due directly to the magnetic field in which the turn lies and to which the current itself gives rise, and that due to the direct physical thrusts of its neighbours. The purpose of this article is to analyse some of the complications which can arise in the calculation of axial forces in transformer windings

WHEN tappings are made in one or both of the concentric windings of a transformer the magnetic field may be such that the axial magnetic force exerted on the successive turns of a particular winding changes sign several times along its length. In such cases complications arise in the calculation of the total axial compressive force at a given point of the winding for it is found that, because a turn of a helical winding can push its neighbour physically but cannot pull it, the exact position of that section of the winding responsible for the physical thrust is not immediately obvious.

Analysis of the conditions under which adjacent forces may be summed algebraically shows that there are points of the winding across which summations cannot be made without careful investigation of the validity of the process and amongst these points is at least one across which summations cannot be made at all. Expressions representing the thrusts of long sections of a winding are therefore built up of a number of smaller basic thrusts each of which involves no awkward point and is therefore obtained by straightforward integration. These basic thrusts are then added together, the conditions under which this can be done being incorporated into the formula with the aid of a simple notation. A methodical way of summing thrusts having been established, the points across which summations cannot be made are determined and all the required formulæ are greatly simplified.

## Thrust Function Discontinuities

A turn of a helical transformer winding can push its neighbour physically but cannot pull it. This simple fact gives rise to considerable complications in the calculation of axial forces though the fact is not mentioned in the literature on the subject (e.g. Waters,<sup>1</sup> Christoffel and Kuster<sup>2</sup>).

\* Electrical Research Association, Leatherhead.

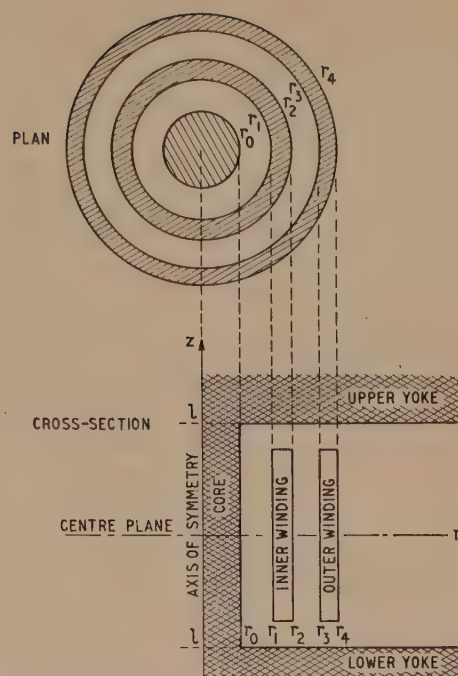


Fig. 1.—Plan and cross-section of the idealised transformer

Consider a closely wound helical winding in which only three turns are energised. Let the turns be P, Q, R, in that order but arbitrarily spaced. If as a result of the current which passes through the turn Q and the magnetic field in which the winding lies, a force is exerted on Q in the direction of P, this force will be transmitted physically through the winding from turn to turn and will make a contribution towards the total compressive force at P. If, however, the force exerted by Q is directed towards R it has no direct effect on the compression at P. It certainly does not increase it and only by opposing a force exerted by R can it reduce it. If there is no force for Q to oppose, then, in so far as the compression at P is concerned, Q is impotent. Further, while Q is merely reducing the thrust of R its precise value is important for the vector sum of the two forces is the resultant force towards P, but if Q goes beyond mere reduction and overwhelms the thrust of R, the exact strength of Q's thrust ceases to be of interest for the resultant thrust is powerless to exert a pull.

The same law applies to sections of winding as to single turns. Consider the compression at P when the whole section PS is energised, S being beyond R. If the thrust of the whole section QR is directed towards P its precise value will have to be considered together with the thrust of PQ in order to determine the required compression, but if it is directed towards S its precise value is of interest only if there is a thrust from RS that it can unsuccessfully oppose.

It is now required to express the above laws in mathematical form.

Let P be a fixed point of the winding as before and let Z be a variable point with position  $z$  relative to some fixed point of the winding. Then the thrust of the section PZ is clearly some function of  $z$ , say  $f(z)$ . Let the sign convention be such that a thrust from PZ towards P is



positive and a thrust away from P is negative. Then, if the thrusts of all the turns of PZ are in the same direction,

the compression at P =  $f(z)$  if  $f(z)$  is positive  
 = 0 if  $f(z)$  is negative or zero.

It will be seen later how the mathematical formulation of thrusts can be developed to include cases in which the thrusts in PZ are not all in the same direction.

### A Special Notation

Define the meaning of the two symbols  $)^+$ ,  $)^-$  by means of the following equations:

$$\begin{aligned} x)^+ &= x && \text{if } x \text{ is positive} \\ &= 0 && \text{if } x \text{ is negative or zero} \\ x)^- &= x && \text{if } x \text{ is negative} \\ &= 0 && \text{if } x \text{ is positive or zero} \end{aligned}$$

The function of the two symbols is clearly to accept or reject quantities according to their sign so that they may conveniently be called respectively a positive filter and a negative filter. Let the range of operation of each symbol extend over that part of the expression which lies on its left.

Examples:

$$\begin{aligned} 3 + 4)^+ &= 7 && 6)^+ + 5)^+ - 9)^+ &= 2 \\ 3 - 4)^+ &= 0 && 6)^+ - 9)^+ + 5)^+ &= 5 \\ 3 + 4)^- &= 0 && -9)^- + 5)^- &= -4 \\ 3 - 4)^- &= -1 && 5)^- - 9)^- &= -9 \\ 5)^+ - 9)^+ &= 0 && -9)^- + 5)^- + 2)^- &= -2 \\ -9)^+ + 5)^+ &= 5 && -9)^- + 8)^- + 2)^- &= 0 \end{aligned}$$

### Force Density, Points of Divergence and Convergence

To give a precise definition of force density it will first be necessary to idealise a transformer winding. A transformer winding will be regarded as a continuous conducting body having the shape of a thick-walled hollow circular cylinder (Fig. 1) in which the current flows only in circles  $r = \text{constant}$  (cylindrical co-ordinates  $r, \theta, z$ ) and in which the magnitude of the current density is independent of  $r$ .

Consider an element of the winding of length  $\delta z$  at the point  $z$ . Then if the small magnetic force exerted on this element is  $\delta F$ , the force density  $\phi(z)$  is defined as the force per unit length, viz.

$$\phi(z) = \lim_{\delta z \rightarrow 0} \frac{\delta F}{\delta z} = \frac{dF}{dz}$$

Let the curve drawn in Fig. 2 represent a specimen force density distribution and let the rectangle drawn beneath it represent the winding as in Fig. 1. Then if the sign convention is such that a downward force is regarded as positive and an upward force negative, the directions of the forces on the elements of the winding are as indicated by the arrows.  $z_1, z_2, z_3, \dots$  are the points at which  $\phi(z) = 0$ . It will be observed that there is a distinct difference between points  $z_1, z_3, z_5, \dots$  on the one hand and points  $z_2, z_4, z_6, \dots$  on the other, for the forces in the neighbourhood of each member of the former set are directed outwards away from the points whereas the forces in the neighbourhood of the members of the latter set are directed inwards towards the points. The significance of this distinction will become apparent

later. Meanwhile, in order to be able to refer to them briefly, they will be called respectively points of divergence and points of convergence.

In general the points at which the force density vanishes are alternately of one kind and of the other but if, for example, the force density decreases to zero at a particular point and then rises again without becoming negative, the point in question falls in neither category but is simply an ordinary point of the winding. The rule that the points  $z_1, z_2, z_3, \dots$  are alternately of one kind and of the other can then be recovered by omitting this point from the labelling.

### Basic Thrusts

Consider the specimen force density distribution  $\phi(z)$  shown in Fig. 2. A positive value of  $\phi(z)$  denotes a force density in the downward (left) direction and a negative value denotes a force density in the upward direction.  $z_1$  and  $z_7$  are respectively the lower and upper ends of the energised section of the winding and  $z_2, \dots, z_6$  are the points at which  $\phi(z) = 0$ .

Let the rectangle in the figure represent the winding

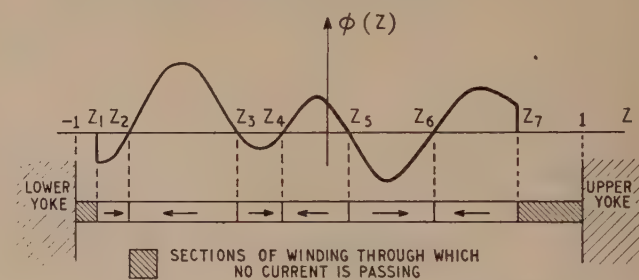


Fig. 2.—Specimen force-density distribution

and let the arrows denote the directions of the forces in the various sub-sections of the winding. Thus, since  $\phi(z) > 0$  in the section  $(z_4, z_5)$  the forces in that section are directed downwards.

The force exerted by the end section  $(z_6, z_7)$  is

$$F_6^7 = \int_{z_6}^{z_7} \phi(z) dz$$

and is directed towards the lower yoke. The force exerted by the adjacent section  $(z_5, z_6)$  is

$$F_5^6 = \int_{z_5}^{z_6} \phi(z) dz$$

and is directed towards the upper yoke.

Consider the sum  $F_6^7 + F_5^6$ . If it is positive it represents the resultant thrust by section  $(z_5, z_7)$  towards the lower yoke but if it is either zero or negative this section makes no contribution towards that thrust. The contribution of this section can therefore be represented by the expression

$$F_5^7 + F_5^6)^+$$

which may be abbreviated to  $F_5^7)^+$ .

Now consider the next section terminated by points of divergence, namely  $(z_3, z_5)$ . If  $F_3^5$  is positive it simply reinforces the contribution of  $(z_5, z_7)$  to the thrust towards the lower yoke by an amount equal to its precise value—a perfectly straightforward contribution—but if it is



negative its precise value is important only if it fails to neutralise the thrust from above, that is if

$$F_6^7 + F_3^5$$

is still positive. If  $F_3^5$  is negative and greater than  $F_6^7$  the section ( $z_3, z_7$ ) makes no contribution to the thrust towards the lower yoke. This contribution can therefore be represented by the expression

$$F_6^7 + F_3^5 +$$

where each positive filter operates on that part of the expression which lies on its left. It must be noted that this expression cannot in general be abbreviated to  $F_3^7$  for

$$F_3^7 = \int_{z_3}^{z_7} \phi(z) dz$$

and this integral will not discriminate between the possible signs of  $F_6^7$  as is necessary but sums the integrand algebraically between the given limits.

Consideration of a few specimen cases should make it clear that the basic thrusts which can be combined to give the total thrust exerted by any given section of winding are those exerted by sections lying between two consecutive points of divergence. No formula giving a total thrust may contain an integral whose limits span a point of divergence without careful consideration of the basic thrusts involved. Thus, continuing the process indicated above, the downward thrust exerted by the section ( $z_1, z_7$ ) is

$$F_6^7 + F_3^5 + F_1^3 +$$

which can be abbreviated to  $F_1^7$  only if the first term and the sum of the first two terms are positive.

In a similar manner it can be seen that the upward thrust exerted by the same section of winding is

$$F_1^3 + F_3^5 + F_6^7 +$$

which can be abbreviated to  $F_1^7$  only if the first term and the sum of the first two terms are negative. Note that in the case of the upward thrust the basic thrusts are considered in the reverse order.

Points of Separation

A point of separation is defined to be a point of a winding across which no thrust is exerted in either direction. (By thrust is meant one of electromagnetic origin; this article is not concerned with forces arising from other sources, for example the tight clamping of the transformer windings in manufacture.) Such a point is necessarily a point of divergence but not every point of divergence is necessarily a point of separation.

It will now be shown that there is at least one point of separation in each winding, the end points being included.

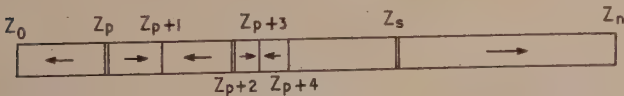


Fig. 3

Let  $z_0$  be the lowest point of the winding (Fig. 3),  $z_1, z_2, z_3, \dots$  the points at which the force density is zero and  $z_n$  the highest point. Assume that there is some thrust on both yokes for otherwise the theorem is trivial;

if there is no thrust on the lower yoke  $z_0$  is a point of separation and if there is no thrust on the upper yoke,  $z_n$  is a point of separation.

Now, since by hypothesis there is a thrust on the lower yoke, there must exist at least one point of divergence  $z_p$  which is such that each of the thrusts

$$F_{p-2}^p, F_{p-4}^p, F_{p-6}^p, \dots, F_0^p$$

is positive. Consider  $F_{p+2}^p$  the next basic thrust above  $F_{p-2}^p$ . If  $F_{p+2}^p$  is positive it may be added to  $F_p^p$  obtaining  $F_{p+2}^{p+2}$  and the next basic thrust  $F_{p+4}^{p+4}$  considered in the same way. If, however, it is negative it will be necessary to consider  $F_{p+4}^p$ . If  $F_{p+4}^p$  is positive it may be added to  $F_p^p$  obtaining  $F_{p+4}^{p+4}$  and  $F_{p+6}^{p+6}$  considered as before. If it is negative consider  $F_{p+6}^p$ , and so on. But since by hypothesis there is a thrust on the upper yoke, a point  $z_s$  (say) must be reached beyond which each of the thrusts

$$F_{s-2}^s, F_{s-4}^s, F_{s-6}^s, \dots, F_s^s$$

is negative so that if  $z_s$  is the first such point each of the thrusts

$$F_{s-2}^s, F_{s-4}^s, F_{s-6}^s, \dots, F_s^s$$

is positive, i.e.  $z_s$  is a point of separation.

It would be possible for there to be several points of separation in each winding. In such a case the total thrust exerted by each section lying between consecutive pairs of these points would be zero.

Illustration:—In the hypothetical case illustrated in Fig. 4,  $z_2, z_4, z_6$  are points of divergence. Find which of

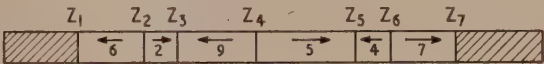


Fig. 4

these points is, in addition, a point of separation

$$F_6^7 + F_4^6 = -7 + -1 = 0$$
$$F_2^3 + F_2^4 = 6 + 7 = 0$$

Thus there is no thrust towards  $z_4$  either from above or from below, i.e.  $z_4$  is a point of separation. However

$$F_6^7 + F_4^6 + F_2^4 = 7$$

so that  $z_2$  experiences a thrust from above and cannot therefore be a point of separation. It will be found that  $z_6$  experiences a thrust of magnitude 1 from below.

Thrusts on the Yokes

Let it be assumed that, in a given case, the following data have been computed, the method adopted being immaterial (see Waters,<sup>1</sup> Christoffel and Kuster,<sup>2</sup> Vein<sup>3</sup> and Goldenberg<sup>4</sup>):

- (i) The zeros of the force-density function  $\phi(z)$  (the points  $z_2, z_3, z_4, \dots$  in the specimen case shown in Fig. 2).
- (ii) The basic thrusts ( $F_1^2, F_2^3$ , etc., obtained by straightforward integration of  $\phi(z)$ ).
- (iii) The points of separation (obtained by the systematic consideration of basic thrusts as illustrated in the previous section).

Then the complications have been overcome and the calculation of thrusts reduced to simple arithmetic.

Let the thrusts exerted on the lower and upper yokes



be respectively  $\bar{T}$  and  $\bar{T}$ . Then if  $z_1$  is the lowest point of separation in the winding and  $z_h$  is the highest

$$\bar{T} = F_1^l = \int_{z_0}^{z_1} \phi(z) dz$$

$$\bar{T} = F_h^o = \int_{z_h}^{z_1} \phi(z) dz$$

### Compressive Force at an Arbitrary Point

Let the point in question be  $z_1$  and let  $z_s$  and  $z_h$  be respectively the nearest points of separation above and below  $z_1$ . Then the compressive force  $F(z_1)$  at  $z_1$  can be expressed by either of the formulae

$$F(z_1) = F_1^s = \int_{z_1}^{z_s} \phi(z) dz$$

$$F(z_1) = F_s^l = \int_{z_s}^{z_1} \phi(z) dz$$

The second formula, since it represents an upward thrust, will be negative but clearly only the magnitude of the force is of interest. In practice the formula which should be chosen is the one which involves the least computation.

### REFERENCES

<sup>1</sup> M. Waters. The measurement and calculation of axial electromagnetic forces in concentric transformer windings. Electrical Research Association Tech. Report Ref. Q/T134. Also published in modified form in "Proc. Instn. Elect. Engrs.", Vol. 101, Part II, pp. 35-46, February, 1954.

<sup>2</sup> M. Christoffel and A. Kuster. Calculation of short-circuit stresses in transformer windings with the aid of digital computers. "Brown Boveri Rev.", Vol. 47, No. 5/6, May/June, 1960.

<sup>3</sup> P. R. Vein. A method based on Maxwell's equations for calculating the axial short-circuit forces in the concentric windings of an idealised transformer. Electrical Research Association Tech. Report Ref. Q/T151.

<sup>4</sup> H. Goldenberg. The determination of axial electromagnetic forces in transformer windings with axial symmetry by means of a resistance network. Electrical Research Association Tech. Report Ref. Q/T154.

## NEW BOOKS

**Induction-Type Integrating Meters.** By G. F. Shotter and G. F. Tagg. Pp. 214; figs. Sir Isaac Pitman & Sons, Ltd., Parker Street, London, W.C.2. Price 63s.

It was in 1936 that Mr. Shotter, in his chairman's address to the Meter and Instrument Section of the Institution of Electrical Engineers, exploded the gliding- or shifting-field theory of the induction-type meter and showed that the action of this instrument could be explained by the transformer or eddy-current theory based upon the interactions of the magnetic fluxes due to the voltage and current coils and the eddy currents induced in the disc. Mr. Shotter and Dr. Tagg have devoted much thought and labour to problems concerned with induction-type meters, and the results of their investigations have been published as reports by the British Electrical and Allied Industries Research Association and as papers in the *I.E.E. Journal*. The volume under review is largely a résumé of these reports and papers.

The theory of the meter is dealt with very fully, but the greater part of the book is devoted to a discussion of the

thirteen parasitic forces acting on the disc and their influence upon the life of the lower bearing of the meter. The authors describe the various models constructed to investigate the effect of each of these parasitic forces on the wear of the bearing under various conditions of loading and of lubrication and with various arrangements of the bearing. They have also developed theories to account for the effects obtained. Some of these theories make considerable assumptions, but they do assist in suggesting the relative importance of the various factors which determine the life of the lower bearing.

One chapter is devoted to the suggestion that a figure of merit should be adopted as a criterion of the performance of a meter, this figure being defined as the ratio of the full-load driving torque to the sum of the frictional torques of the bottom bearing and the register. The last two chapters deal with the protection of jewels and pivots from damage due to mechanical shock and to the cleaning of jewels and pivots. The authors recommend the use of spring carriers for transport and for keeping the meters upright when oil lubrication is employed.

Those concerned with the design, construction and maintenance of induction-type meters will find this volume most helpful and stimulating.—E.H.

**Principles of Semiconductors:** Introduction to the Properties and Applications of Semiconducting Materials. By M. G. Scroggie, B.Sc., M.I.E.E. Pp. 156; figs. Published for *Wireless World* by Iliffe Books, Ltd., Dorset House, Stamford Street, London, S.E.1. Price 21s.

This book surveys the whole field of semiconductors and their numerous and diverse applications. Although first published in America, it has been completely anglicised and re-illustrated. One of its most important aims is to provide sufficient basic theory for the reader, new to the subject, to easily understand the more advanced literature and articles regularly published in technical journals. The second aim is to explain the special properties of semiconductors and illustrate how these are applied to many kinds of useful devices. In the introductory chapters, starting from the structure of the atom, the author gradually leads up to an explanation of the principle of semiconduction. He then describes the action of typical semiconductors and of the various types of junctions. A chapter on diodes and rectifiers then follows. After describing the various types of transistors, the author turns to a discussion of photocells, solar generators and photo-electromagnetic cells. A final chapter deals with such devices as varistors, thermistors, scintillation counters, solid-state masers, strain gauges and Zener diodes. Other important subjects discussed are the Hall effect, electroluminescence and refrigeration by semiconduction.

### BOOKS RECEIVED

**Printed Circuits.** Their design and application. By J. M. C. Dukes. Pp. 228; figs. Macdonald & Co. (Publishers), Ltd., 16, Maddox Street, London, W.1. Price 40s.

**Case Studies in Electromagnetism.** Problems with Solutions. By Hermann A. Haus. Laboratory Experiments. By John P. Penhune. Pp. 336; figs. John Wiley & Sons, Ltd., Gordon House, Greencoat Place, London, S.W.1. Price 52s.



# VIEWS on the NEWS

By "REFLECTOR"

WHEN the country was divided up among the Electricity Boards by the 1947 Electricity Act there were a few peculiar cases in which undertakings found themselves in alien areas. Most of these anomalies were eventually straightened out but, surprisingly, the rectification process has apparently not been completed even now. It is reported by "Seaboard," the South Eastern Electricity Board's magazine, that the Purley undertaking, which is within the South Eastern territory, is about to be transferred to the Board. Before nationalisation the undertaking belonged to the County of London Electric Supply Co. That company's interests were acquired by the London Electricity Board and it has never been officially handed over to the South Eastern Board although that Board has administered it as a part of its Croydon and Purley District.

\* \* \*

One of the features of the *Electrical Contractor and Retailer* is a long-range weather forecast. Evidently it is intended to help members of the Electrical Contractors' Association to fix suitable periods for the more exposed outside jobs which they undertake. In the May issue of the journal E.C.A. members are enjoined and encouraged to participate in the Association's annual conference at Torquay from 1st to 5th June. Upon referring to the weather section, which I have already mentioned, I find that one of the expected warm periods forecast for the south-west of England is from 1st to 5th June and the month's rainfall is expected to be below the average.

\* \* \*

A correspondent to the *Cumberland & Westmorland Herald* says that the North Western Electricity Board has announced a "revision" or "variation" of its tariffs, adding, "Note the careful avoidance of the word 'increase.'" I have noted this reluctance on the part of Boards generally (and others) to be candid in the matter of higher charges. Customers are not really deceived by the euphemisms employed on such occasions.

\* \* \*

Cases of overcharging for electricity by landlords and others continue to be reported and no doubt there are other instances which are never heard of. The matter has been raised by the Students' Union in Cardiff, which has also drawn attention to similar practices with regard to gas. The 1957 Electricity Act expressly provides against this overcharging and it empowers the Boards to

fix maxima for "retailed" electricity. When this is done, any excess is recoverable by the victim, but by what process is not laid down. The South Wales Board has not yet fixed maximum charges (nor so far as I know has any other Board) but it will do so if it finds that overcharging is more prevalent than it is thought to be. The Wales Gas Board has similar powers and has exercised them but it, too, does not appear to think that the practice is widespread.

\* \* \*

I recently mentioned that a foreman in the Kingston (Surrey) area had been delegated to appease people on the route of a seven-mile 132 kV cable for any inconvenience caused to them. A report in the *Stockport Advertiser* shows that the Central Electricity Generating Board has made a similar appointment in connection with the laying of three miles of cable in Stockport. This seems to have been made rather belatedly for it appears that there has been much disruption of business to the annoyance of people who did not know what was happening. Strictly, the Board is not compelled to give notice of its intentions to individuals on the route, but it is conducive to better understanding if in fact it does inform them. One would have thought, however, that the local highway authority had some responsibility in the matter.

\* \* \*

The necessity for ensuring a supply of properly trained engineers was recognised half a century ago as witnesses the following comment from the *Electrical Review* of 12th May, 1911:—

"The subject of the education and training of engineers is undoubtedly one of the most important matters that can occupy the attention of our great engineering societies; we are pleased, therefore, to learn that the Institution of Civil Engineers has decided to summon a conference on the question, to meet at the Institution on 28th and 29th June. The necessity of the conference has arisen, naturally, out of the conditions laid down for the qualifications of candidates for election into the Institution; having specified the results to be arrived at, and provided means to test the attainment of the standard set, the Council now proposes to deal with the methods of preparation to be adopted with a view to compliance with its requirements. . . . The questions to be discussed are divided into three sections: general education, scientific training and practical training, and a number of subjects have been specified for consideration at the conference, embracing various phases and aspects of the course of preparation necessary for the efficient development of the embryo engineer."



## Letter to the Editor

*Letters should bear the writers' names and addresses, not necessarily for publication. Responsibility cannot be accepted for the opinions expressed by correspondents.*

### Oil-Filled Cables

ON reading the author's summary on "Oil-Filled Cables" which appeared in your issue of 28th April the various opinions expressed by members of the Supply Section of the Institution of Electrical Engineers were of particular interest to me.

In my letter "Cable Dielectrics" (*Electrical Review*, 29th April, 1960) I suggested a new type of high-voltage cable which I beg to suggest would have met the operating conditions the members feel desirable for satisfactory operation for electrical transmission and a cable designed without wood-pulp paper.

The members criticised the present methods and materials used for cables, but no alternatives were suggested. As Dr. Miranda said, the design of a cable was based on one factor only, "ability to withstand the impulse test," hence the request in my letter for an impulse test on a dry paper sample cable to prove whether it is the paper that provides the requisite insulating properties or the gas or oil filling.

Mr. D. J. Skipper (C.E.R.L.) said that at 600 kV the dielectric losses in oil cable dielectric were likely to be such that little or no useful power could be transmitted and the need for a lower loss, lower dielectric-constant material other than paper would be paramount. This is in line with my proposal for oil- or gas-filled cables whereby only a totally gas-filled cable can comply with the conditions to transmit useful power.

Uttoxeter, Staffs.

WALTER KNIGHT.

## N.P.L. REPORT

PROPOSALS for a new research and development programme on high-speed digital computers to be carried out as a co-operative effort by Government laboratories and industry, are described in the National Physical Laboratory's report for 1960,\* published last Tuesday. The N.P.L., which is already carrying out research into computing elements, would have a major part to play in this programme. The Executive Committee has also put forward a suggestion for the purchase of a research reactor, to be sited at Teddington, for standards work and for basic research by both the N.P.L. and the National Chemical Laboratory. The Committee wishes to build up the general standards work for radiology, but since the report was prepared it has been decided to alter the priorities in the purchase of machines needed for this work. Although a research reactor will be needed in due course, it has now been agreed that a more urgent requirement is a Van de Graaff electrostatic generator.

Using ultra-high-pressure apparatus built at the N.P.L. to a modified American design, the Basic Physics Division has carried out studies of the effect of pressure on the resistivity of semiconductors, and produced coesite, a dense

form of silica, and some very small artificial diamonds. Work has continued during the year on measuring the dielectric properties and the low-frequency dynamic properties of polymers.

Control of complicated industrial processes, such as the distillation column in an oil refinery, may be optimised by special computers permanently attached to plants and "learning" as the inputs and demands change. The first steps have been taken, with encouraging results, towards the building of an exceptionally fast analogue computer of such a type.

The high-speed computer group is working on the development of the planar cryotron as a computing component. This gives promise of higher speeds, greater reliability, and smaller size for computers of the future. The Division is also working on the mechanical translation of scientific Russian into English, automatic retrieval in libraries and automatic reading of both printed and handwritten numerals.

A crucial experiment in the Light Division was the attempt to measure light as a "visually weighted" radiation which has been passed through a filter transmitting, at every wavelength, a fraction proportional to the sensitivity of the eye at that wavelength. First results were very encouraging and aroused considerable international interest. The Division will now redetermine the N.P.L. radiation scale, after which they may be able to propose the application of an absolute radiometric method to the measurement of light.

At the end of the year, a small research group was formed to study lasers, which are new powerful sources of nearly monochromatic light obtained by stimulating emission in fluorescent crystals. The aim will be to find out what factors control the light output and to build experimental lasers for pulse and continuous operation, which can be used in new applications.

The new programme of the reorganised High Temperature Materials Laboratory will include a greater concentration on new materials of very high melting point. The first experiments will be on the materials for the first of the new power stations using supercritical steam and later on the more advanced supercritical stations that will follow.

Work in ferrous metallurgy by the Metallurgy Division, using the electron microscope, continues to make progress, and will have many industrial applications.

## Reactor Symposium

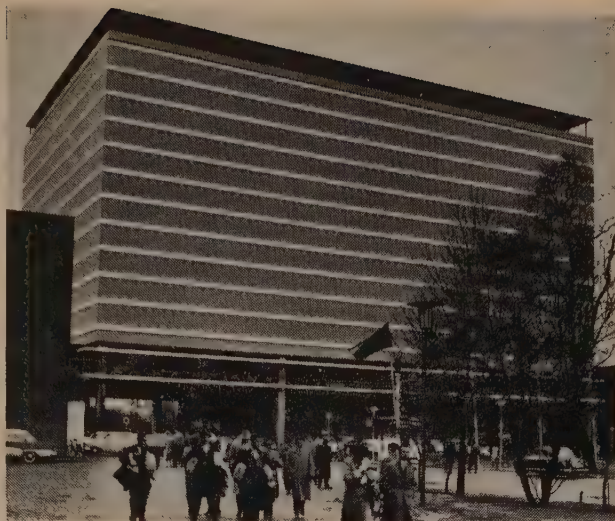
THE Institute of Physics and the Physical Society, in collaboration with the British Nuclear Energy Conference, is sponsoring a symposium on "The Physics of Graphite-Moderated Reactors" to be held in Bournemouth from 4th to 6th April, 1962. The provisional programme includes a half-day's visit to the Atomic Energy Establishment at Winfrith, Dorset. A number of papers have already been promised and further contributions will be considered by the committee. The symposium is intended particularly for the less senior members of the research and development staffs working in this field. First preference to attend will be given to members of the constituent bodies of the British Nuclear Energy Conference. Further information can be obtained from the secretary of the Institute of Physics and the Physical Society at 47, Belgrave Square, London, S.W.1.

\* H.M. Stationery Office, 9s 6d.



*This five-storey building, one of four in the electrical section, is devoted to the exhibits of 150 manufacturers of lighting fittings*

## FULLER BRITISH PARTICIPATION NEEDED



# HANOVER FAIR

**S**IZE and efficient organisation are the first and lasting impression on the visitor to the Hanover Fair. The size of the Fair both in the area covered and the range of goods displayed would be overwhelming without strict segregation of the exhibits into separate halls and a two-part catalogue that provides an extremely detailed buyers' guide. This year the problem of finding what one wishes to see has been further simplified by the application of data processing. A small computer has been installed in a room alongside the main entrance. Punched cards are arranged in racks around the walls and when the visitor has selected those covering the items in which he is interested he feeds them into the computer. Within a few moments he is provided with an alphabetical list of the exhibitors and a map on which their positions have been overprinted.

Segregation is applied not only by industries but within the electrical section. This covers an area of 100,000 square metres in four halls and there were 1,242 exhibitors, including 215 foreign firms. The electrical section covers the whole field of electrical engineering from generating plant to transistors and television. Though the Germans

have their own separate radio show later in the year the display of radio and television receivers and "Hi-Fi" apparatus at Hanover approximates in size to our own radio show at Earls Court. In addition, there are large sections covering electronics and instruments; components, valves and lamps; and domestic appliances. For comparison again it may be noted that this last section was much more extensive than any display of electrical appliances included in an exhibition in England. The exhibits just mentioned are contained in two buildings, each with two floors. The third electrical building has five floors completely devoted to displays of lighting fittings for industry and the home, and some of the firms here expect to do about 75 per cent of their year's business at Hanover.

The heavy electrical equipment, including telecommunications, is grouped in the fourth building, and alongside this is the *Freigelände*, where large transformers and switchgear, trolley-buses and locomotives are assembled in the open.

Inside also the emphasis is everywhere clearly placed on the equipment being shown with plenty of space



*A typically spacious stand in the electrical machinery hall and (right) part of the instruments and electronics section*



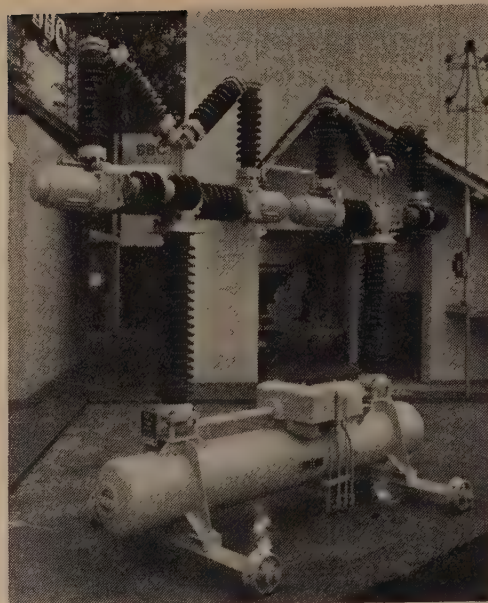
around the exhibits and in the gangways. Many of the exhibitors hold their stands on a five- or ten-year lease and since the halls are not used for anything else the larger electrical companies have been able to fit up permanent suites of offices with interview rooms and kitchens behind their stands. Another striking contrast with many exhibitions in this country was in the quality and numbers of people staffing the stands. On all four days we were there it was possible to talk to directors of even the largest companies and to senior engineers responsible for the design of the equipment on the stand. In two or three cases at least practically the whole of the publicity department were present for the duration of the exhibition, carrying out much of their normal work from offices on the stand.

Another feature of the Hanover Fair is the comprehensiveness of the displays. Though naturally the presentation draws attention to new developments, most firms aim to show a full range of products. The individual stands and even more the exhibition as a whole thus provides a physical catalogue of modern electrical engineering development probably unrivalled anywhere in the world. In many parts of the exhibition machines can be seen not only operating but producing. On the Siemens stand an area about three times the size of the largest stands at the A.S.E.E. exhibition was devoted to a demonstration of the part that data processing and electronic control can play in factory and business management.

There is no doubt that the opportunity that Hanover provides for seeing and comparing such a vast collection of equipment is one of the main reasons why the exhibition is attracting engineers in increasing numbers from all parts of Europe and the world. The fair has grown rapidly in size and number of exhibitors. This year the 506,000 square metres of stand space was divided between 5,000 exhibitors (a fifth from abroad).



One-tenth scale model of a 6,700 h.p. 25 kV a.c. locomotive for Russia with one of the six 1,500 kW silicon rectifier units (Siemens)



110 kV air-blast circuit-breaker for arc-furnace control (Brown Boveri)

The one major disappointment was to find that the British electrical industry was so poorly represented. At the most 33 British electrical firms had equipment on show at this year's fair, and only five had stands of their own with a further ten on the group stand of the British Electronics Centre. It is encouraging to learn that this venture is now receiving greater support and that there is a waiting list for membership. There is such a pressure on space at Hanover that enlargement of the stand will prove difficult. Though the present display is effective and the participants seem well pleased with the impact they have been making, it cannot at its present size do justice to the full effort of the British components industry, which has a strongly expanding market in Germany and elsewhere in Europe.

It is worth noting here that most of the British exhibitors emphasised that in showing at Hanover they were not merely trying to attract the attention of German buyers. In fact some of them were precluded for various reasons from selling directly in Germany. They regard Hanover as an international exhibition, and this view was supported by all the German and foreign exhibitors talked to. The exhibition has also great value as a central meeting place for agents and foreign representatives.

The experiences of the British exhibitors at Hanover show that there are many and varied opportunities for British firms in Germany and Europe. The major problem of the German electrical industry at present is one of extended delivery. The ability to offer quick delivery, sometimes at lower prices than those of local firms, has provided an opening for British exports which is being exploited. Nevertheless, it was emphasised repeatedly that a permanent place in such a competitive market can be obtained only on the basis of quality and technical superiority. With the rapid pace of advance in most fields any lead is likely to be short lived and the sales effort must be backed by continual development.

Complete success is likely to be obtained only where the whole company is export minded and competitive by





Part of 550 kV substation (auto-transformer, current transformer and circuit-breaker) for Russia on the French industry's outdoor stand

world standards. It is to this that Kenwood attribute their remarkable progress. The products they are now selling have been developed after a study of requirements in all parts of the world. They now export 60 per cent of their production and in Germany they claim to have 20 per cent of the market for mixers and at least 50 per cent of that for washing machines. Superior quality, readiness to meet the needs of the market, efficient agents and hard work have also enabled two other domestic appliance firms, Wilkins & Mitchell and Easiclene, to obtain a firm place in the German market which they are confident of holding. Though all three firms would like to see a more stable home market, their high level of sales abroad has been an important factor in helping them to weather the fluctuations at home.

In another field, British Federal Welders have built up a useful export business in the last few years in both Eastern and Western Europe by their willingness and ability to design special machines. They contrasted the large numbers of useful visitors to their stand at Hanover with the poor attendance at the recent welding exhibition in London. British industry may be inadequately represented in numbers, but we were most impressed by the attitude and enterprise of the people we met on the British stands.

Political and other considerations make it difficult to sell heavy electrical equipment to highly industrialised countries. But this has not deterred the French from putting on a comprehensive co-operative display, organised by the trade association of the French electrical industry.

Sixty-five firms were showing on four stands with a total area of 4,000 square metres. The director of one of the larger manufacturers said that the French electrical industry regards Hanover as the best exhibition for showing its products because of the large number of foreign visitors. French firms are doing good business in industrial and installation material in Germany where they are helped by their lower prices and their ability, in many cases, to offer delivery in a quarter the time of their German

competitors. Export is encouraged by remission of the sales tax that is levied on each transaction throughout French industry. Since a greater profit may thus be secured on overseas business, French firms are willing to divert to export goods being produced for home customers. (The German sales tax tends to work in the same way, and in addition has encouraged firms to concentrate production in their own works to avoid the tax on bought-in components.)

A further large co-operative display, mostly of photographs, was put on by 50 French companies active in the nuclear energy field. Here and elsewhere there was evidence of French firms' willingness to work together in the design and production of equipment for export.

Most impressive among the French equipment exhibited at Hanover was part of a substation which is one of several ordered from French firms for connecting the 550 kV Stalingrad-Moscow line with the 115 and 240 kV lines around Moscow. Of the nine single-phase auto-transformers, six will be grouped to form two three-phase units of 270 MVA and the remainder a 300 MVA three-phase unit. The air-blast circuit-breakers are rated at 25,000 MVA.

Another interesting French exhibit was a transformer built by Electro-Mécanique in which the low-voltage output can be varied linearly by adjustment of the relative positions of the concentric windings. It can also be used to provide a fixed secondary voltage for variations of up to 20 per cent in the primary supply. Units are available with ratings from 25 to 800 kVA.

Any general survey of the massive assembly of equipment and apparatus at Hanover can only be superficial and highly selective. Again, as has been mentioned previously, one is more immediately impressed by the evidence of development over the whole field of electrical equipment and its application, than by the novelties. Nevertheless, a few new items being shown by the larger companies can be singled out.

Brown Boveri were showing one phase of a 110 kV air-



blast circuit-breaker specially developed for the control of arc furnaces. It has a short-circuit rating of 3,000 MVA and can operate 50,000 times before the contacts have to be replaced.

Also on this stand was a silicon rectifier unit with an output of 100 A at 300 V which can be built up into assemblies with a rating of 100 kW. A transistorised "dead man" control for locomotives, which eliminates contacts and the need for mounting equipment on the axle, was demonstrated alongside a conventional type. The equipment applies the brakes within 100 yd, irrespective of the speed of the train, if the driver fails to cancel its operation at one-minute intervals.

The most conspicuous item on the stand of the Siemens organisation was a full-scale, fully operational training reactor and control desk. The reactor has a continuous rating of 0.1 W and can be installed and operated in existing laboratories without the need for special constructional precautions. Higher ratings are also available.

A model of a 6,700 h.p., Co-Co, 25 kV, 50 c/s a.c. locomotive being supplied to Russia was shown in association with some actual items of equipment, including one of the six 1,500 kW silicon rectifier units and a high-speed interruptor and control unit for over-current protection of the rectifiers.

A model of 50 similar locomotives, being supplied by a group of four French manufacturers for the trans-Siberian railway, was shown on the French industry's stand. These locomotives each employ six groups of two ignitron rectifiers instead of semiconductors and the ten for passenger working have a top speed of 160 km/hr.

Another interesting model on the Siemens stand was of a 175 MVA waterwheel generator for Furnas, Brazil, which is claimed to be the largest yet built in Europe. Though the complete generator weighs 770 tons, and the stator has an external diameter of 13.5 m, the weight of individual parts had to be limited to 60 tons for transport to the site. At the other end of the generation scale was a 2 kVA petrol-driven set with transistorised control of the field excitation. A new type of full thermal protection for motors uses minute temperature detectors of semiconductor material embedded direct in the motor winding.

The electrical system of an articulated trolley-bus shown outside also contained a number of innovations. The electromagnetic contactors, built into the front part of the

bus, are controlled by means of a foot-operated controller which is monitored by an electromagnetic damping and interlocking system free of wear. This causes the self-excited rheostatic brake to be applied quickly and reliably, thus reducing the speed of the vehicle considerably and consequently ensuring minimum wear of the brake linings.

Hartmann & Braun had a new self-contained a.c. Schering bridge for measuring the dielectric losses of h.v. apparatus. It can be used on earthed objects such as cables and a unit is incorporated to allow the measurement of the corona voltage before flashover takes place. It is suitable for charging currents of 15 A, or up to 1,000 A with external shunts.

The use of nuclear power for electricity generation received only minor attention from the main electrical companies but the DEMAG organisation, which is associated with Atomics International of America, had an extensive display of proposals for power stations and a ship's reactor. Brown Boveri, Siemens and A.E.G. have each built or are building in Germany nuclear stations of about 15 MW, but only the high-temperature gas-cooled reactor which the first company are constructing with Krupps at Jülich is of original design, the others being copies of American stations. Spending by the German Government on nuclear research is very small and since the utility companies are reluctant to spend money at this stage on a system of generation for which they have no early need, the full cost of development falls on the electrical manufacturers. There were indications at Hanover of the growing pressure that is being put on the German Government by industry to provide more direct financial help and it was hoped that this would be obtained in the next Budget. Though they appreciate the present value of the practical experience being gained by British firms, German electrical manufacturers do not feel that they will be at any great disadvantage in the long run from their later start. Incidentally, A.E.G., who were showing a model of a proposed 250 MW boiling water reactor, have engineers from seven countries receiving instruction in nuclear engineering at their works.

The German electrical industry is responding energetically to the competitive challenge of the Common Market and the growth of foreign interest in their rapidly expanding market is not feared by the large firms. In fact by forcing them to constantly improve their efficiency it has

been a direct contribution to their success abroad. German makers of electrical instruments, for example, have reached a gentlemen's agreement to reduce wasteful competition among themselves by each firm concentrating on a limited range of types. Rationalisation of production between the electrical industries of the Common Market countries is thought to be inevitable.

In conclusion, participation by the British electrical industry in the Hanover Fair would seem to be desirable not only for commercial reasons but also to bring the industry into closer contact with the trends of development on the Continent. But to make an impression such participation must be on a large scale.



The British Ambassador in Bonn, Sir Christopher Steele, is introduced to Mr. Hirst, of Geo. Bray & Co., Ltd., on the British Electronic Centre stand



## ELECTRICAL MANUFACTURE IN EUROPE

# Norway's Growing Interest in Exports

By AAGE SNILSBERG

(Chairman, National Association of the Electro-technical Industry, Oslo)



Modern Norwegian church illumination

The structure of the electrical industry in Norway has been determined by the small size of the population and by the requirements of basic industries developed to utilise the country's abundant hydro-electric power

IN reviewing the electrical manufacturing industry in Norway it may be useful to look for a moment at its beginnings and the background against which it has grown. The industry was started in the 1880's, but during the first 20 to 30 years it was on a very moderate scale and was largely dependent on technical assistance from foreign countries, since the first technical university in Norway did not come into existence until 1910. It was realised at an early stage that the rich natural resources in the country's waterfalls could be utilised for electricity production, and that this source of energy would become a factor of considerable economic importance for both household purposes and industrial development.

The vast scale of electricity production in Norway is entirely based on water power. Before the development of large-scale industrial enterprises the installed capacity of hydro-electric machines was less than 100 MW, and from 1908 to 1919 the annual growth in capacity was under 100 MW.

As a result of economic crises and instability in the period from 1920 to 1940 the annual additions to machine capacity declined from this level, being slightly over 40 MW per year. Since the second world war, however, power development has proceeded at an accelerating speed as can be seen from the following table which shows the average annual figure for each of five periods, including the current period (estimated):—

1945-1948 approx. 110 MW per year

1949-1951 " 170 " " "

1952-1955 " 285 " " "

1956-1958 " 330 " " "

1959-1962 " 475 " " "

In 1958 the output of electricity corresponded to 7,800

kWh per capita, which is the highest individual consumption in the world. It has been estimated that about 3.5 million people in Norway—corresponding to 99 per cent of the population—now have a regular supply of electricity. By comparison, the coverage in such countries as the United States, Canada and Switzerland is about 95 per cent. The consumption of electricity has shown a corresponding growth. In 1937-1938 it was 8,955 million kWh, in 1950-1951 15,568 million kWh, and in 1958 23,925 million kWh. The amounts taken by different types of consumers in 1958 are shown in Table 1. It has been calculated that consumption in 1959 amounted to about 29,000 million kWh. In a forecast submitted to the O.E.E.C. the total demand in 1975 has been estimated at 70,000 million kWh, corresponding to an annual increase of 2,500 million kWh.

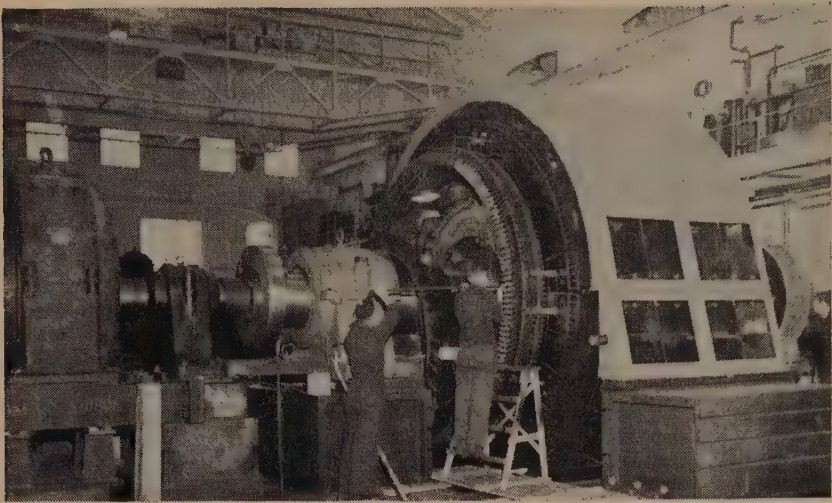
## Manufacture on a Modest Scale

Compared with this large production and consumption of electrical energy, the size of the electrical manufacturing industry in Norway is modest. According to the industrial statistics this branch of industry is composed of about 150 companies, including several repair shops,

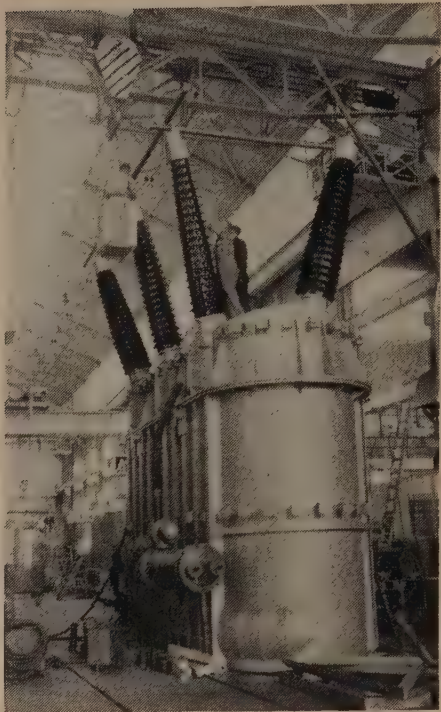
Table 1.—Electricity Consumption in Norway, 1958

	Mill. kWh	Per cent
Mining ...	235	1.0
Pulp and paper industries ...	1,650	6.9
Basic chemical industries ...	4,360	18.2
Primary iron and steel industry ...	2,450	10.2
Other primary metal industries ...	3,600	15.3
Other industries and handicrafts ...	2,170	9.1
Electric boilers ...	690	2.9
Railways and tramways ...	310	1.3
Other types of consumption (households, businesses, etc.) ...	8,400	35.1
Total ...	23,925	100





Heavy engineering production : A 7,500 V, 38,000 kVA generator for Lyso Kraftverk ...



... and a 75,000 kVA transformer for Hamar, Norway

with a total of about 15,000 employees and a total annual production valued at about £30 million. It is a typical home-market industry, the great majority of enterprises are small, and it is noteworthy that five of the leading companies account for about 50 per cent of the total production.

The value of the total demand for electrical goods in Norway in 1958 was about £50 million; domestic production thus covers about two-thirds, leaving the remaining third to be imported. Electrical manufacturing represents about 3·4 per cent of Norway's industrial capacity and about 4 per cent of the total employment. Despite the small size of the electrical industry, the sector engaged in the development of hydro-electric power, power transmission and large machines is quite considerable even by European standards. It had a total turnover in 1958 of £10 million (excluding power cables for transmission lines and installations). It has contributed largely to the development in Norway of electro-technical and other industrial activities based on electrical energy. The primary electro-chemical industry is not included in the production statistics of the electrical industry, although it depends largely on cheap electric power. This industry consumes about 4,400 million kWh, or 20 per cent of the total output of electricity, and plays an important part in the economic life of the country. Other important industries, such as the aluminium industry, also depend on cheap electricity.

As much as 20 per cent (1958) of the output of the electrical industry in Norway consists of domestic electrical appliances. If radio sets, incandescent lamps, installation equipment and other material needed for domestic requirements are also included, we arrive at a figure of more than 50 per cent of the total demand for electrical goods. The home industry provides a large part of this demand, but there are also large imports. Table 2 shows the production, imports and exports of electrical equipment and apparatus in 1958.

**Growth Since the War**

The rapid rate at which Norwegian water power has been exploited since the war has been accompanied by a continuously increasing production of generators, transformers and other equipment for installation in the power stations. The output of the electrical engineering industry has grown from £15 million in 1950 to £31 million in

1958, the increase being lower than the average for all O.E.E.C. countries. The demand for transformers, particularly, has expanded greatly since the war. The reason for this is that electric power in Norway has to be transmitted over long distances from the power stations to the industrial centres and the voltage is converted up or down in several stages. There has been an increasing demand for all sorts of transformers with voltage regulating equipment, transformers for smelting furnaces, rectifier transformers, etc. Norway's requirements of transformers are well met by a corresponding assortment of types available from local manufacturers whose productive capacity is several times larger than before the war and in 1958 was valued at £28·5 million.

Manufacturers producing cooking and household appliances have also experienced a very strong development, and during the last 25 to 30 years they have had the home market almost entirely to themselves. At least 95 per cent of the electric cookers now in use in the country were produced in Norwegian factories. The same applies to electric heating appliances. The production of other domestic electrical appliances, particularly washing machines and, more recently, refrigerators, has also increased markedly since the last war.

Norwegian cable factories have gradually developed a

Table 2.—Norway's Production, Imports and Exports of Electrical Goods 1958 (million Kr\*)

	Production	Imports	Exports
Electrical machinery ... ..	90·2	99·9	7·55
H.v. switchgear, etc. ... ..	23·5	23·5	—
Insulators ... ..	6·7	9·4	—
Insulated cables and wires ... ..	142·0	14·2	4·5
Dry batteries, accumulators ... ..	16·0	11·4	1·0
Telephone, telegraph, radio ... ..	141·9	69·4	24·3
Meters, instruments, etc. ... ..	19·7	14·1	0·2
Installation material, including low voltage material ... ..	38·6	28·3	0·7
Incandescent lamps, etc. ... ..	19·3	11·1	0·3
Domestic appliances ... ..	124·8	37·3	5·1
Sundry products ... ..	n.a.	29·3	30·0
Total ... ..	622·7	347·9	73·6

\* 20·023 Krone = £1.



comprehensive production programme and, generally speaking, the productive capacity is considered to be sufficient to cover the country's normal requirements. Production in 1958 was valued at £8.5 million. The productive capacity for electric motors has also been expanded and now provides a large part of the country's requirements of standard industrial and agricultural motors. Besides the normal three-phase motors Norwegian manufacturers also supply a large number of d.c. motors and complete driving units for special purposes, such as larger paper-making machines, rolling mills, grinding mills, etc. The telecommunication industry has grown to a size which, generally speaking, is sufficient for domestic requirements, and some products are being exported. Technical development here is rapid, and a new demand has arisen in the field of television. There is a considerable import of special equipment and of components.

### Interest in Exports

As stated earlier, the electrical manufacturing industry in Norway has concentrated on the home market, and mainly provides for the needs of the electricity supply and other basic industries. The great tasks which have been accomplished have required a considerable investment of capital and qualified personnel. It is perhaps for this reason, and the country's small capital resources, that the production of electrical consumer goods has not reached the high level which might have been expected by comparison with the electrical industries of other European countries. It will be observed from Table 2 that total electrical exports in 1958 amounted to about £3.6 million or 7.3 per cent of the total domestic demand, or about 12 per cent of home production. The corresponding percentage for the United Kingdom is 32 per cent, and for Germany 42 per cent, and for all the O.E.E.C. countries together 20 per cent.

However, an increasing interest in exports is noticeable among Norwegian electrical firms, and the total for 1960 has been estimated at about £4.5 million. These exports consist mainly of electrical machinery, telecommunication equipment, radio receivers and tape recorders. The export market for tape recorders, which has been developed in the United States by one of the leading Norwegian radio manufacturers, is particularly remarkable.

It should be noted in connection with exports that some of the leading electrical companies in Norway belong to or are associated with foreign concerns, and were probably originally established mainly for the purpose of supplying the local market. The export business of these important factories will be influenced by the production and distribution policy of the parent companies.

### Import Opportunities

Norway's total imports of electrical goods in 1958 amounted to £17 million, and Table 2 shows that there is considerable scope for selling to Norway electrical machinery, telecommunication and radio equipment, installation material and household appliances. However, a change is about to take place as a result of the considerable development of local manufacture in recent years. In some fields, for instance, cables and wires, transformers, wireless sets and the usual types of incan-

descent lamps, self-sufficiency has been or is about to be achieved.

It is difficult to say whether this situation will be affected by the present moves towards European economic integration. Considerable preparatory work is at present being undertaken by foreign electrical industries, and when tariff protection has disappeared there will presumably be a certain increase in imports. A regular television service was only started in Norway last year. There is expected to be a considerable volume of sales of domestic receivers and a lively interest in imports, but for the present the existing import regulations present an obstacle to imports on a large scale.

### International Co-operation

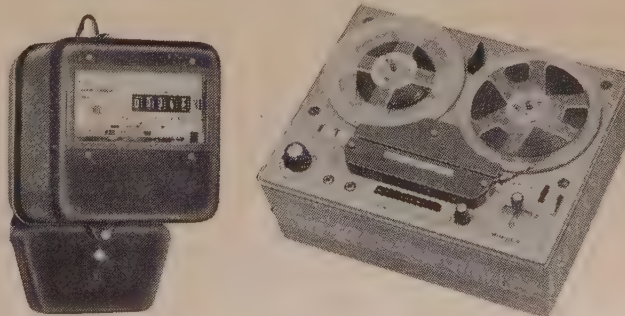
The Norwegian electrical industry has realised the necessity for European integration and has declared that it is prepared to accept the consequences. It is realised that certain sectors of the industry may experience difficulties from the more intensive competition expected.

With regard to plans for co-operation in the field of technical standardisation and specifications, Norway has for a long time been a member of the I.E.C. and C.E.E. Since 1930 it has been a legal requirement in Norway that all electrical appliances intended for the general public shall be subject to inspection before being approved for sale. Such inspection is carried out by the Board for Testing and Approval of Electrical Equipment, the purpose being to protect the general public against fire risk and the risk of electric shock. The specifications for electrical appliances and equipment are mainly in conformity with the C.E.E., but in some cases they have been adapted to special Norwegian conditions. Since 1955 the approval boards of Norway, Sweden, Denmark and Finland have co-operated in an effort to arrive at uniform specifications and testing methods for various products.

With other E.F.T.A. countries, Norway is participating in establishing contact with the E.E.C. countries in order to co-ordinate specifications and inspection regulations. The standardisation of electrical products is in the hands of the Norwegian Electrotechnical Committee, but—like other similar efforts in Norway—it has not yet become as extensive as might be desirable.

Although Norwegian institutions and electrical companies are thus already participating in various international activities, there is still insufficient contact with certain organisations abroad. This may be due to the fact that the electrical industry in Norway is not organised in a single federation, but in different groups associated with other industrial organisations.

*Typical Norwegian products include this household kWh meter with cyclometer dials and a four-track stereophonic tape recorder*





# Dounreay Hold-up Cleared

THE causes of the gas entrainment in the liquid metal coolant of the experimental fast breeder reactor at Dounreay have been established, and the engineering modifications necessary to prevent this behaviour are well in hand. Gas entrainment, which has been one of the major problems holding up work at Dounreay, arises from the small size of the reactor core, which means that very high heat ratings are involved. Liquid metals are the only suitable coolants for removing the large quantities of heat generated from such small volumes, and in D.F.R. an alloy of sodium and potassium is used. This alloy oxidises extremely easily and therefore catches fire if exposed to air. Consequently the spaces above the coolant in the reactor must be filled with an inert gas. Nitrogen is the gas used for this purpose in D.F.R.

During the first physics experiments in the D.F.R. programme small changes of reactivity were noticed, which were found to be due to bubbles of nitrogen becoming entrained in the sodium/potassium coolant passing through the core. Gas entrainment is a serious problem not only because of the reactivity changes which result, but because under power conditions the heat transfer properties of the coolant would be impaired, leading to local hot spots which could in turn bring about melting of the fuel. Preliminary tests were made which indicated that one source of the trouble was the liquid metal expansion tanks above the primary circuits. A reduction in the level of liquid metal in these tanks was found to be allowing gas to pass down a pipe which was normally filled with liquid metal. Further experiments in the reactor and in a water model showed that other possible sources existed. The opportunity was taken during the shut-down for change of core in the summer of 1960 to install further instrumentation and viewing devices which would help to locate the trouble spots.

The complexity of the circuit ruled out any comprehensive theoretical determinations of flow problems and a series of many hundreds of experiments under varying conditions was carried out to establish the mechanisms by which gas entrainment was taking place. These were found to be:—(i) The emptying of expansion tanks, already described; (ii) the pressure drop occurring at certain coolant flow rates in the vertical tubes which form part of the control rod mechanisms causing nitrogen to be drawn down the tubes into the main circuit; and (iii) a similar effect occurring in the instrument thermocouple tubes which lead down into the core. The tank emptying effect was found to be due to the blocking of certain small pipes and these are being cleared. Modifications are being made to the control rod and thermocouple tubes to alter their hydraulic characteristics by providing relief holes and baffles.

At the conclusion of this work the programme for raising the reactor power will be reviewed. So far, the reactor has been operating at low powers (up to 1.4 MW) to enable the physics of the system to be studied. The results have been most encouraging and the forecasts made from the original work at Harwell and Risley have proved to be accurate and well founded.

The core of the reactor can accommodate special fuel

sub-assemblies similar to those which will be used in the prototype commercial power fast reactor, and these are being developed by the Fuel Element Group. Experimental rigs for the prototype fast reactor-fuels are also being irradiated in D.M.T.R. to provide the necessary data. Chemical processing of the first D.F.R. charge has been successfully carried out and this has proved the satisfactory operating characteristics of the processing plant. Chemical development work is needed for the production and processing of the new types of fast reactor fuels and this work is continuing. The experimental results obtained from D.F.R. over the next few years will be of vital importance to the framing of an economic nuclear power programme.

## Electric Vehicle Association Report

THE annual report of the Electric Vehicle Association of Great Britain, Ltd., presented at the 27th annual general meeting on 4th May states that the approximate number of electric vehicles in use in Great Britain and Northern Ireland at the end of 1960 was 38,184 compared with 36,555 in 1959. The 1960 figure represents 26,758 driver-seated vehicles and 11,426 pedestrian-controlled vehicles.

In the report it is stressed that whilst the foregoing is useful in showing the increase in the number of electric vehicles it does not present the complete picture as it only refers to registered vehicles—these being the only figures available. There is no record of the large number that have gone into use during the year in factories and other private property. Bearing on this aspect the report for 1959 stated that nearly 59 per cent of the inquiries circulated to members were for industrial and hospital services. In 1960, however, with a larger total number of inquiries, the number received from similar sources increased to approximately 80 per cent.

The total membership of the Association at the end of 1960 was 36, including nine associate members. Displays were staged at a number of exhibitions during the year, including the Dairy Show and the Mechanical Handling Exhibition, where a large amount of space was occupied by electric vehicles and trucks, and by battery-making members.

A survey to ascertain the use made of electric vehicles in electrical works was reported last year and following this activity an inquiry into the state of affairs in the food industry was put in hand. Much work was involved and it was not possible to complete the investigation in 1960. The report states that because of its cleanliness and fumelessness the electric vehicle has very special advantages for the food industry.

Information was provided for the Board of Trade, Ministry of Transport and other bodies and the Association's chairman and deputy secretary attended a meeting to discuss matters arising in connection with learner drivers and electric vehicles. The views advanced on behalf of electric vehicles were strongly supported by the Association's president.



## MODERN ELECTRICAL DISTRIBUTION SYSTEMS



STANDARD CABLE TRUNKING  
SPECIAL CABLE TRUNKING  
SPRUNG COVER CABLE TRUNKING  
PLUG-IN CABLE TRUNKING  
FUSE TAPPED BUSBAR  
STANDARD UNDERFLOOR DUCT  
SHALLOW CHANNEL UNDERFLOOR DUCT  
SINGLE AND DOUBLE DUCT RISING MAINS

**G.E.C.**

**INSTALLATION EQUIPMENT GROUP**

SWITCH AND FUSE GEAR • H.R.C. FUSES • OVERHEAD BUSBARS  
RISING MAINS • CONDUIT • PIRELLI GENERAL CABLE • CABLE TRUNKING  
UNDER FLOOR CABLE DUCTS • ELECTRIC WIRING ACCESSORIES • BELLS

THE GENERAL ELECTRIC CO. LTD., MAGNET HOUSE, KINGSWAY, LONDON, W.C.2.

INSTALLATION EQUIPMENT GROUP HEADQUARTERS, FOUR ASHES, WOLVERHAMPTON



Complete schemes and designs can be prepared without obligation to meet specific requirements of architects, consulting engineers and electrical contractors.





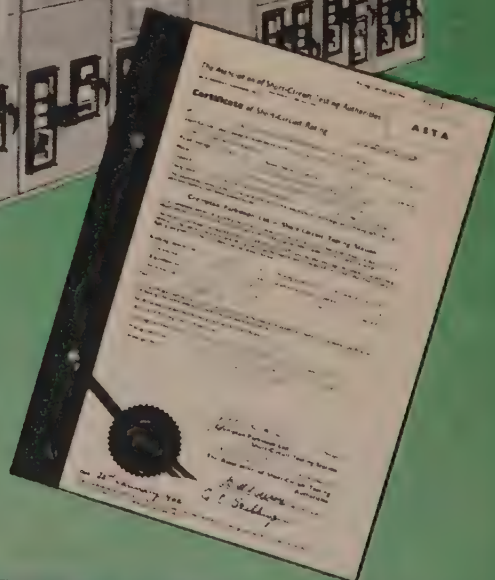
LOW VOLTAGE A.C.

# AIR CIRCUIT BREAKERS

ASTA CERTIFIED for 31 MVA 415v.

Types available —

- Fixed type for either back or front of panel mounting
- Horizontal draw-out
- Metal enclosed
- Up to 3000 amps rating



## J. G. STATTER & CO. LTD.

Telephone: LITTLE CHALFONT 2671/6

AMERSHAM COMMON, BUCKS,

Telegrams: STATTER AMERSHAM

A MEMBER OF THE  METAL INDUSTRIES GROUP





At the E.D.A. annual luncheon, left to right : Sir Edwin Herbert, Mr. Alfred Robens, Mr. D. B. Irving, Mr. J. I. Bernard, Sir John Hacking, Mr. S. M. Rix and Mr. W. B. Noddings

## E.D.A. REPORT AND LUNCHEON

THE record demand for electric water heaters and cooking appliances last year, despite the reimposition of credit restrictions, may be regarded as some testimony to the value of the British Electrical Development Association's national advertising and the success of the Electricity Boards' sales campaigns. Another outstanding trend, highlighted in the Association's annual report presented at the annual general meeting last Tuesday, was the increased interest in electric floor warming for all kinds of buildings.

During 1960, E.D.A. national advertising again concentrated on improving the domestic load through the sale of electric cookers, water heaters and refrigerators. To increase impact, advertising of refrigerators was concentrated in the spring, while water heating and cooking advertisements appeared throughout the year, the latter reaching maximum intensity in the autumn.

An extensive range of promotional and display material incorporated the slogan "Get up to date—Go electric" and the "Little Boy" symbol was produced in local support of national advertising and sales of this material and other novelty items reached higher figures than ever before. A promotional film of electric cooking and two 30-second cinema advertising films on electric cooking and water heating were completed during the year. New publications included folders and leaflets on the three main subjects and two publications on the ring circuit wiring system.

The E.D.A. stand at the Ideal Home Exhibition produced over £47,000 worth of immediate sales and a considerable amount of business to be followed up. This compared with £34,000 worth of business passed to Electricity Boards the previous year. In addition, there were 423 inquiries for water heating and other items and during the exhibition over 25,000 verbal inquiries were dealt with. A commercial model electric firelighter, shown at the Clean Air Exhibition at Harrogate, created a great deal of interest and other displays emphasised the part that electricity can play in the "Clean Air Campaign." Over 30,000 visitors inspected the electrical section at the Building Centre during the year and of 21,000 requests for information

about electrical matters 67 per cent came from home builders or householders who wished to improve their homes electrically and some 15 per cent came from architects, surveyors and builders. The most popular subject was space heating (28 per cent of the total), nearly half of the questions relating to floor warming. A marked trend was the increased interest in modular lighting shown at the Building Centre.

Statistics collected by the Association show continued progress in 1960 in the sales by the Boards of the two major load-building domestic appliances. The number of cookers sold exceeded the 1959 figure and sales of water heaters rose by nearly 10 per cent. Although refrigerator sales suffered, they nevertheless were less than one-sixth below the record level reached in 1959.

The Association continued to urge the need for a more generous provision of socket-outlets and evidence was submitted to the Ministry of Housing and to the Ministry of Works to show that the cost of sockets on a ring circuit becomes progressively lower per socket as the number increases. This evidence is being considered by the Ministry of Housing and it is hoped that the number of sockets recommended in the Housing Manual will be increased.

Interest in off-peak heating continued to increase during the year and a brochure entitled "Notes on the Construction and Finish of Floors that are to be Electrically Warmed," published in the autumn, met with a great demand and the supply of copies was quickly exhausted. Talks on electric heating in churches were given to invited audiences of architects and others at Coventry. In the



Lord Citrine, Sir Charles Westlake, Sir Hamish MacLaren and Mr. A. L. G. Lindley





Left to right: Mr. T. E. Daniel, Mr. R. R. B. Brown, Miss Mary George, Sir George McGlashan, Mr. A. N. Irens and Mr. D. P. Sayers

industrial field advertising in the form of data sheets on electrical aids to industry was continued in over 100 trade and technical journals and among new data sheets published during the year were three on dielectric heating, two on electric motors and controls, and one on infra-red heating. The four E.D.A. industrial films were in considerable demand, each being borrowed over 100 times during the year by industrial concerns, professional institutions and educational establishments.

The extension of electricity supply lines to a high proportion of farms and rural premises was reflected in record demands for the Association's farming and horticultural publications. Several new publications were issued during 1960 and a record number of over 47,000 copies were distributed during the year.

Displays were arranged at a number of industrial exhibitions throughout the year, including the Electrical Engineers Exhibition, the Production Exhibition, the Fuel Efficiency Exhibition and the Factory Equipment Exhibition. As part of its educational work E.D.A. organised an electricity "quiz" for the National Union of Townswomen's Guilds.

The Association, as a founder member, continued to support the British Lighting Council whose Press and publicity activities were almost trebled over the previous year. There was greatly increased activity in promotional conferences for industrial and commercial interests and preparations were made for a special drive on office lighting to coincide with the forthcoming legislation and technological advances. Throughout the year close liaison was maintained with the Electric Traction Committee of the Municipal Passenger Association and other bodies and reprints of an *Electrical Review* article on Bournemouth's trolley-bus system were widely distributed.

The year also saw the establishment of the British Electrical Approvals Board which had decided to utilise the E.D.A. Testing House as the principal testing organisation. Of the 568 appliances examined during the year, 361 were tested on behalf of Electricity Boards or for manufacturers.

### Annual Luncheon

The principal guest at the annual luncheon held at the Savoy Hotel, London, on Tuesday, was Mr. Alfred Robens, chairman, National Coal Board. Sir Edwin Herbert, president of the Association, was in the chair. Mr. Robens said there had been a striking and continuous rate of growth in the consumption of coal in power stations. In 1950, consumption was just over 30 million tons, com-

pared with 50 million in 1960—an increase of 70 per cent. Quoting 1959-60 alone, Mr. Robens said that an increase of  $\frac{1}{2}$  per cent in operating efficiency gave the C.E.G.B. a saving on fuel costs of £3.3 million. He forecast that the demand for coal for electricity would go up to half the total output in the foreseeable future. On the other side of the picture, continued Mr. Robens, the National Coal Board bought 2,000 million kWh from the public supply system in 1950, whereas in 1960 it purchased well over twice that amount. He spoke of the co-operation between the electricity and coal industries and said that the purchases of power had increased in value in the last ten years from £7 million to £25 million a year, and as the mechanisation drive went on the Coal Board's requirements of electricity would go on rising. The Board, he said, had promoted a sales campaign to maintain production at an economic level and was also engaged on a tremendous drive on management and mechanisation.

The increase in the Coal Board's consumption of electricity was typical in industry and the home generally of the trend towards "piped" and "wired" fuels with all their qualities of convenience and ease of operation. "Coal by wire," he said, was the most sensible way to use the product that the Coal Board produced. In conclusion, he said that the Electrical Development Association had undoubtedly played a most important part in sponsoring new and expanding uses for electricity. He wished the Association similar success in the future—in the interests of coal as well as of electricity.

Sir Edwin Herbert said it was indeed gratifying to hear that electricity was the best customer. Electricity and development, he said, were synonymous, and he went on to outline the development of electricity. The increased thermal efficiency of power stations, said Sir Edwin, was just one example.

### Annual General Meeting

Mr. David Irving, chairman of the Council, presided at the subsequent annual meeting at which the report and accounts were adopted. It was announced that Sir Edwin Herbert had been reappointed president for a further year and that Lt.-Col. E. H. E. Woodward had been reappointed a vice-president. After the usual vote of thanks the meeting terminated.

Later, at the first meeting of the new Council, Mr. R. R. B. Brown (chairman, Southern Electricity Board) was elected chairman for 1961-62 and Mr. D. H. Kendon (chairman, Merseyside and North Wales Electricity Board) vice-chairman.



# PERSONAL AND SOCIAL

## News of Men and Women of the Industry

**Mr. W. N. C. Clinch, M.I.E.E.**, controller of the Eastern Division of the Central Electricity Generating Board, retired from that position at the end of April. Mr. Clinch, one of the best-known personalities in the industry, served for some years with the former Northmet Power Co. before his appointment in 1930 as borough electrical engineer of Brighton. He returned to the Northmet Co. in 1943 as assistant general manager and later in that year succeeded Capt. J. M. Donaldson as general manager. He was appointed controller of the Eastern Division when the electricity supply industry was nationalised in 1948.



Mr. W. N. C. Clinch

Five new appointments are announced by Marconi's Wireless Telegraph Co., Ltd. **Mr. R. Telford, B.A.(Cantab.), M.I.E.E.**, relinquishes his position as general works manager and is appointed general manager; **Mr. H. J. H. Wassell, O.B.E., B.Sc.(Hons.)**, becomes works manager, Chelmsford; **Mr. E. Eastwood, Ph.D., M.Sc., M.I.E.E.**, chief of research, is appointed director of research responsible to the managing director for the company's research policy; **Mr. E. N. Elford, O.B.E., A.M.I.E.E.**, relinquishes his post as manager, Radar Division, to undertake special duties for the managing director, particularly in connection with Marconi's activities in the defence field; and **Mr. T. W. Straker, M.Sc., Ph.D.**, at present deputy manager of the Radar Division, is appointed manager in succession to Mr. Elford.

Mr. Telford held a number of

appointments with Marconi's from 1946 to 1950, when he became assistant to the general manager. He was appointed general works manager in 1953. Mr. Wassell joined the company in 1929. In 1949 he became head of the Radar Development Group, and subsequently chief radar engineer, and manager, Test Department. Dr. Eastwood became chief of research at the Marconi Research Establishment at Great Baddow in 1954. He joined the Marconi Company in 1948 as deputy chief of research, after two years with the English Electric Co., Ltd., in charge of the radiation laboratory. Mr. Elford re-joined Marconi's in 1946 after a career in the regular army and was appointed assistant sales manager, subsequently becoming manager of the Radar Division. Dr. Straker, a New Zealander by birth, was appointed deputy manager of the Radar Division in September last year. Previously he was chief of the Projects Co-ordination Group, Research Division, at the Research and Development Laboratories at Great Baddow.

**Mr. J. C. Simmonds, M.Sc.(Eng.), Ph.D., M.I.E.E., M.I.Mech.E.**, has been appointed to the board of Thermionic Products, Ltd. Dr. Simmonds, who was formerly with the Radio Branch of the General Post Office Engineering Department, joined Airmec, Ltd., in 1946 and was appointed managing director in 1954; he is also managing director of the British Communications Corporation, Ltd., and deputy managing director of the Radio & Television Trust, Ltd.

The Prestcold Division of the Pressed Steel Co., Ltd., announces the following appointments:—**Mr. F. W. Harriss** is appointed marketing manager, commercial, and will be responsible to the home sales manager for

all activities covering sales of Prestcold commercial refrigeration equipment; **Mr. J. Parker**, until recently deputy general manager of the London Region, has now been appointed general manager; **Mr. P. F. Hodge** is appointed general sales manager, London Region; **Mr. H. Higson** is appointed manager of the North Wales branch; and **Mr. F. R. Best** is appointed field sales manager—domestic in a national capacity.

**Mr. John Clark (Plessey Co., Ltd.)** has been elected vice-chairman of the Radio and Electronic Component Manufacturers' Federation, in succession to **Dr. G. A. V. Sowter (Telcon Metals, Ltd.)** who is now chairman.

**Mr. Norman Elce, M.Sc.Tech., M.I.Mech.E.**, director and chief mechanical engineer, Associated Electrical Industries (Manchester), Ltd., has retired after 41 years with Metropolitan-Vickers and the A.E.I. group. He has been appointed consultant to the managing director at Manchester. Mr. Elce received his technical education at the Manchester College of Technology and served a college apprenticeship with the Metropolitan-Vickers Electrical Co., Ltd. In 1922 he joined the staff of the Mechanical Engineering Department, specialising in steam nozzle and turbine blade research, and later he assumed responsibility for industrial turbines, turbines for advanced steam conditions, and turbines for marine applications. In 1944 he was appointed assistant to the chief mechanical



Mr. N. Elce



Mr. R. Telford



Mr. H. J. H. Wassell



Dr. E. Eastwood



Mr. E. N. Elford



Dr. T. W. Straker



engineer of the company, became assistant chief mechanical engineer in 1948 and was appointed director and chief mechanical engineer in 1950. Mr. Elce was elected a vice-president of the Institution of Mechanical Engineers in 1957.

The Fellowship of the City and Guilds of London Institute has been conferred upon **Mr. C. O. Stanley**, C.B.E., chairman of the Pye Group, "in recognition of his professional status and achievements."

**Mr. A. J. Dalton**, A.M.I.E.E., who retired from the position of chief commercial engineer with the South Wales Electricity Board on 30th April, started his career in the electricity supply industry more than 50 years ago with the Weymouth undertaking. Later he held various positions with the Newcastle-upon-Tyne Electric



Mr. A. J. Dalton

Supply Co. and then, after twelve years as an engineer on his own account, he was appointed deputy borough electrical engineer of Dorchester. From 1936 until vesting date he was electrical engineer and manager of the Milford Haven undertaking. Mr. Dalton has been succeeded by **Mr. D. G. Gwyn**, B.Sc., M.I.E.E., formerly manager of the Board's Monmouthshire and Mid-Wales Area.

Members of the B.E.A.M.A. Arc Welding Electrode Section have presented a Persian carpet to mark the service to the industry of **Mr. W. W. Watt**, C.B.E., who became the first chairman of the Section when it was formed in 1939 and continued in that office until his retirement last January. A luncheon in his honour was held at the Connaught Rooms on 2nd May, presided over by **Mr. L. A. Lidstone**, chairman of the Section. The guests included **Sir Charles Lillicrap**, K.C.B., M.B.E., president of the British Welding Research Association, **Sir Leslie**



Presentation to **Mr. W. W. Watt**, C.B.E., on his retirement from the B.E.A.M.A. Arc Welding Electrode Section. Left to right: Messrs. **J. Strong** (British Oxygen Co.), **L. A. Lidstone** (ESAB. Ltd., and chairman of the B.E.A.M.A. Arc Welding Electrode Section), **W. W. Watt**, **R. L. Swan** (Lincoln Electric Co., Ltd., and vice-chairman of the Section) and **R. W. Ayers** (Sciaky Electric Welding Machines, Ltd.)

**Robinson**, K.B.E., C.B., of the Board of Trade, and **Mr. J. Turnbull**, of Lloyd's Register of Shipping.

**Mr. Watt** was managing director of the British Oxygen Co., Ltd. (whose associate companies include Quasi-Arc, Ltd.), from 1937 to 1956, when he retired from active business. He was president of the Institute of Welding in 1941.

**Mr. H. T. Spink**, who has been appointed works manager of Erskine, Heap & Co., Ltd., started with the company in 1931 and for the last six years has been assistant works manager. He takes over from **Mr. E. A. Panter**, who retired as works director at the end of March but is still associated with the company on a part-time basis as works technical consultant.



Mr. H. T. Spink

Three new directors have been appointed to the board of Brookhirst Igranic, Ltd. (Metal Industries Group). They are **Mr. N. Clark**, the company secretary, **Mr. H. Rothwell**, A.M.I.E.E., chief development engineer, who becomes works director, and **Mr. A. E. Williams**, A.M.I.E.E., chief application engineer, who becomes chief engineer of the company.

**Mr. Clark** joined Brookhirst Switchgear in 1952 and became company secre-

tary the following year. On the amalgamation with Igranic Electric in 1959 he was appointed secretary of Brookhirst Igranic. **Mr. Rothwell** was a designer and later works manager with Brookhirst Switchgear before moving to the Bedford works. **Mr. Williams** started as an apprentice with Igranic and in 1953 was made head of the Engineering Department. Six years later he became Brookhirst Igranic's chief application engineer.

**Mr. D. G. Sinfield**, manager of the Welding Division of C. A. Parsons & Co., Ltd., has retired after 31 years with the company. He was a past-chairman of the North-Eastern (Tyne-side) Branch of the Institute of Welding and was branch secretary for ten years.

**Mr. R. G. Round**, A.M.I.E.E., second assistant engineer in the Northmet Sub-Area of the Eastern Electricity Board since 1949, has been appointed Norfolk Sub-Area engineer in place of **Mr. C. C. Brazier**, who has taken up a similar position in the Essex Sub-Area. **Mr. Round** previously served in the Welwyn Garden City District and before nationalisation held appointments with the Bermondsey Electricity Department and the County of London Electric Supply Co.



Mr. R. G. Round

The **Birmingham Electrical Golfing Society** held its first meeting of the season at Sandwell Park Golf Club on 27th April when 25 members competed for the spring trophy. The winner was **Mr. E. G. Noake** and the runner-up **Mr. S. A. Seccombe**. An extraordinary general meeting was held



Mr. N. Clark



Mr. H. Rothwell



Mr. A. E. Williams



immediately following dinner, when Mr. F. C. Mealing was elected an honorary life member in recognition of his services as hon. secretary/treasurer from 1956, when the Society was formed, until ill-health forced him to resign early this year.

This year's golf match between the **Electrical Industries Club** and the **Birmingham Golfing Society** is to be held on 28th June, at Frilford Heath, near Abingdon. Lunch and supper have been arranged and the total inclusive cost per person is 35s. Any member of the E.I.C. wishing to play should write to Mr. R. W. Holledge, Stearn Electric Co., Ltd., 31, Vauxhall Bridge Road, S.W.1, as soon as possible.

**Mr. Derek Whipp** has been appointed regional engineer for Central England of the British Lighting Council. He will operate from 111, New Street, Birmingham, 2 (telephone: Midland 4622). For a number of years Mr. Whipp represented F. W. Thorpe, Ltd., in the East Midlands and more recently he has been a director of Fibalite, Ltd.



Mr. D. Whipp

Before a crowd of 1,000 spectators on the perfect B.I.C.C. pitch at Belvedere, Kent, the teams of Telephone Cables, Ltd. (formerly Southern United Telephone Cables and now an A.E.I. subsidiary) and B.I.C.C. Melling (Winding Wires Division) fought a thrilling cup-tie for the 1961 C.M.A. Football Cup. The result was a win for Telephone Cables by 2-1. The

cup was presented to the winners at the annual dinner in the evening by Mr. J. C. Moston (managing director, Connollys (Blackley), Ltd.), president of the competition. The runners-up were awarded the Griffiths Trophy and individual players were presented with plaques. Mr. W. A. H. Brown, chairman of the competition, presided.

**Mr. W. Bolton**, A.M.I.E.E., first assistant district engineer, Guildford District, South Eastern Electricity Board, has been appointed engineer in the Thurrock District of the Eastern Electricity Board, to succeed Mr. D. J. Agnew. Before joining the electricity supply industry in 1936, Mr. Bolton had been with the Northmet Power Co., Smiths Instruments, Cheltenham, and Muirhead & Co.



Mr. W. Bolton

**Mr. A. J. Nicholas**, C.B.E., managing director of South Wales Switchgear, Ltd., has had conferred upon him the livery of the Worshipful Company of Tin Plate Workers *alias* Wire Workers.

At the annual dinner of **Switchgear & Equipment, Ltd.**, at Banbury on 28th April Mr. D. A. J. Oxley, managing director, referred with satisfaction to the company's progress with the contract to build 275 kV isolators for the South of Scotland Electricity Board. He said they had executed the contract entirely in addition to their normal business and he thanked all employees for their efforts in making this achievement possible. More guests than ever before were entertained by the company at this year's

function. Of the 282 people attending the dinner a large proportion were engineers from the Area Boards.

## OBITUARY

**Lt.-Col. R. K. Morcom.**—The sole remaining member of the original Council of the British Electrical and Allied Manufacturers' Association, Lt.-Col. Reginald Keble Morcom, C.B.E., M.A., M.I.E.E., M.I.C.E., M.I.Mech.E., died at Bromsgrove, Worcs., on 5th May; he was eighty-five. After education at Marlborough College and Trinity College, Cambridge, Col. Morcom underwent training with Belliss & Morcom and Siemens Bros., Woolwich. He became a director of Belliss & Morcom in 1904 and subsequently chairman. He was also chairman of Daniel Adamson & Co., Ltd., and W. Sissons, Ltd., for some years.

As already stated, Col. Morcom was one of the founder-members of the B.E.A.M.A. Council; he served as chairman from 1925 to 1929 and was then a vice-president until his retirement from the Council in 1947. He was also a vice-president of the Federation of British Industries, of the I.E.E. (1912), the Wembley Exhibition Committee and the first World Power Conference. He was a member of the Advisory Committee of the Department of Overseas Trade and of the 1930 British Economic Mission to the Far East. During the 1914-18 war he served with distinction in the Royal Engineers.

Col. Morcom married, in 1904, Frances Isobel, the daughter of Sir Joseph Swan, F.R.S., and had two sons.

**Mr. W. Donovan.**—The death occurred on 3rd May at Edgbaston of Mr. Walter Donovan, A.M.I.E.E., for many years chairman of the Donovan Electrical Co., Ltd., Birmingham; he was in his ninetieth year. Mr. Donovan was born at Woolwich and educated at the Birkbeck School; he was trained at the works of the Jablochoff Co. Before the formation of the Donovan Electrical Co. he was with Crompton & Co. and at the Calcutta office of the Oriental Telephone & Electric Co., Ltd.

**Mr. J. L. Hill.**—The death occurred on 4th May of Mr. John Lawrence Hill, London area manager of Rowlands Electrical Accessories, Ltd., with whom he had been associated for nearly thirty years.

**Mr. J. Dawes**, manager of the cubicle manufacturing factory of Evershed & Vignoles, Ltd., at Power Road, Chiswick, died recently. He was 77.



Annual dinner of Switchgear & Equipment, Ltd. Left to right: Mr. J. S. Lombard, B.Sc., M.I.E.E. (chief engineer, South Wales Electricity Board) and Mrs. Lombard; Mr. D. A. J. Oxley (managing director, Switchgear & Equipment, Ltd.) and Mrs. Oxley; and Mr. A. G. Milne, M.I.E.E., M.I.Mech.E. (chief engineer, London Electricity Board) and Mrs. Milne



## INDUSTRIAL NEWS

### Importance of the Common Market to the Electrical Industry

WILL British firms be faced with insuperable difficulties unless Britain joins the Common Market? This is one of the questions answered by Mr. Arnold Lindley, chairman of G.E.C., in a wide-ranging discussion published in the May issue of *The Director*.

"The Common Market," Mr. Lindley says, "is very important to the U.K. electrical industry and one views the U.K.'s exclusion from it with alarm." He points out that exports of electrical goods to the Commonwealth have remained static for the last few years while those to the Common Market have increased steadily and in 1960 accounted for 12 per cent of all electrical exports. "The shrinkage of such an important, fast-developing market will be serious," Mr. Lindley continues.

On the general subject of how to improve British industrial competitiveness, Mr. Lindley says that there are certain facts which have to be accepted.

A new and revolutionary code for education is urgently required if the country is to take its place in the modern world of science, technology, commerce and social behaviour; a

drive towards the greater use of aids to labour in industry is needed to assist production; there should be a greater concentration of human and financial resources in the interests of exports.

This means, Mr. Lindley adds, that "every man from top to bottom must tighten his belt for a temporary and

limited period, after which standards of living should improve..."

In his own industry, Mr. Lindley sees the chief promise of rapid growth in the light electrical field. "In the domestic equipment industry," he comments, "there is likely to be a striking growth, given a satisfactory fiscal policy, and it is the housewife who is creating the pressure here, in her demand to be relieved from domestic chores, rather than the manufacturer. Drudgery is on its way out for women just as it is for men in industry..."

### Engineers and Building Design

THE 56th annual dinner of the Institution of Engineers-in-Charge was held at the Connaught Rooms, London, last Friday under the chairmanship of Mr. L. Copeland Watts, the Institution's president. The toast to the Institution was proposed by Dr. F. M. Lea, director of the Building Research Station, which he said was interested in all aspects of engineering in factories, hospitals and large blocks of offices and flats. The advance of science and engineering had brought many things but these did not usually include simplicity and with the increased complexity of plant the responsibility of the engineer-in-charge had grown. In a modern hospital some 30 to 40 per cent of the cost was for the

engineering services and the annual cost of such services as lighting, heating and general power was some £100 per bed per annum.

Dr. Lea thought that insufficient notice was taken of engineers' opinions and requirements in the design stage of a building. He forecast wider use of moving pavements, even in office corridors, and thought that the technique of using three dimensional models in place of general arrangement drawings would spread as they were not necessarily more expensive and would also serve as instructional models for training operatives. The response was made by the chairman.

A toast to the guests and friends was proposed by Mr. W. J. Watkins, chairman of the Institution's finance and general purposes committee, to which the response was made by Mr. W. E. Humphrey, president of the Society of Engineers.

### New G.E.C. Companies

AS part of a reorganisation following the acquisition of Radio & Allied (Holdings), Ltd., the General Electric Co., Ltd., announces that a new company has been registered with the title of G.E.C. (Radio & Television), Ltd., which will be responsible for market operations under the G.E.C. trade mark. Both this company and Radio & Allied (Holdings) will continue to operate independently in the market with their separate and identifiable ranges of receivers. All correspondence in connection with

G.E.C. radio and television products should be addressed to Langley Park, Slough, Bucks. (telephone: Slough 22201), the sales headquarters of the new company.

It is understood that the formation of two other companies, G.E.C. (Home Products), Ltd., and G.E.C. (Domestic Equipment), Ltd., is also planned.

### Russian Atomic Scientists' Visit

Following informal discussions between Sir Roger Makins, chairman of the United Kingdom Atomic Energy Authority, and Professor V. S. Emelyanov, director of the U.S.S.R. Main Administration for the Utilisation of Atomic Energy, Prof. Emelyanov and a number of his colleagues are paying a visit to the United Kingdom next week. They will discuss with the Atomic Energy Authority arrangements for further collaboration in the peaceful uses of atomic energy and will visit some nuclear establishments.

### NEW DESOUTTER FACTORY

Desoutter Brothers (Holdings), Ltd., announce that they have acquired a factory of 25,000 sq ft at Angmering, Sussex, formerly occupied by Crawley Metal Productions, Ltd. It is proposed to form a new wholly-owned subsidiary with a nominal capital of £250,000 to operate this new acquisition as a separate unit of the Desoutter Group.

### Prices of Materials

In the accompanying table we give the basis prices of the more important materials used in the electrical

ALUMINIUM ingots	ton	£186	os	od
COPPER, H.C. Electro	ton	£241	5s	od
Fire Refined 99.70%	ton	£240	os	od
Fire Refined 99.50%	ton	£239	os	od
COPPER Tubes ..	lb	2s	4d	
Sheet .. ..	ton	£273	15s	od
H.C. wire and strip	ton	£292	5s	od
LEAD, English ..	ton	£67	15s	od
Foreign .. ..	ton	£66	os	od
MERCURY .. ..	flask	£67	os	od
TIN, block (English) ..	ton	£860	10s	od
ZINC, G.O.B. Foreign	ton	£83	5s	od
BRASS Tubes (solid drawn) .. ..	lb	1s	10½d	
Wire .. ..	lb	2s	9½d	
PHOSPHOR BRONZE				
Wire .. ..	lb	4s	2½d	
PLATINUM .. ..	oz	£30	5s	od
RUBBER, No. 1 R.S.S. spot .. ..	lb	26½d—26½d		

industry. The figures given are the selling prices and are those quoted on Tuesday last.



## C.E.G.B. Standards Too High for Spain

THE report of the F.B.I. delegation which visited Spain in February, under the leadership of Sir William McFadzean, draws attention to the effect of the high standards demanded by the Central Electricity Generating Board on the sales of British electrical equipment overseas. Commenting on the fact that British prices in Spain are sometimes too high the report says:

"There is no doubt that the standards and requirements of the Central Electricity Generating Board in the U.K. are so high that, in many cases, these account for the price difference, and while one cannot advocate a drop in standards, it is well worth examining from a price point of view whether we are not at a considerable disadvantage in selling heavy electrical goods in Spain and elsewhere to the standards demanded by C.E.G.B., rather than dropping our sights as the Continentals do to meet the price demand, while still manufacturing above the minimum standard requirements."

Despite some local manufacture, "there is undoubtedly still very much scope for the sale in Spain of heavy, particularly generating, plant." It is important, however (the report continues), that British electrical firms should be aware of the changed circumstances in the Spanish market since the introduction of the Stabilisation Plan. Now that bilateral quotas represent a diminishing amount of the whole and the liberalised and global quota sectors are widening all the time, British exports must be competitive. Prices in some cases are out of line at the present time. Where the price margin is not so great, British goods can be sold on their quality and standards, provided these factors are made selling points by the supplier.

Much more flexibility in credits was demanded in order to match offers from competitors. Technical collaboration in the form of investment or licensing agreements was stressed as an all-important feature in selling and a means, in some ways, of overcoming the price differentials. "British manufacturers have largely shown themselves reluctant to enter into such arrangements, while the Germans, Swiss and French are well entrenched. The high level of their exports of

these goods comes about because of these special arrangements."

### Local Manufacture

By far the largest of the electrical manufacturing companies in Spain is General Electrica Espanola, S.A. Its range is considerable and it has recently produced a transformer of 40 MVA, the largest built in Spain, and claims to have produced waterwheel alternators up to 80 MVA. Siemens of Germany are active through Siemens Espanola, and the Westinghouse licensee, Cenemesa, has recently added high-voltage circuit-breakers to its range. In addition, a number of other Spanish manufacturers operate in liaison with overseas companies. As a rule they work on a non-exclusive

basis and it is not unusual to find a Spanish manufacturer co-operating with competing firms from abroad.

Electric power consumption in Spain has risen from 8,800 million kWh in 1950 to 18,500 million last year. The total installed capacity in 1950 was 3,400,000 kW whilst in 1960 it was 8,000,000 kW. Approximately 70 per cent of the installed capacity is hydraulic, the rest being thermal. A number of hydraulic power stations are at present under construction, in which British contractors are participating, and there are plans for others. There are also plans for seven nuclear power stations to be built over the next fifteen years. The Spaniards do not propose to place a large order before 1963-64 but when they do they expect British firms will be very much in the running.

## Electricity at the Chelsea Flower Show

ELECTRICAL horticultural aids for the commercial grower as well as the amateur gardener will be featured on the Electrical Development Association's stand at the Chelsea Flower Show next week. As in previous years the emphasis will be on automatic control and labour saving. The Association's display will stress the value of electricity, not only for growing but for many other tasks, including compost mixing, propagating, water supplies, heating and preparing pot plants and cut flowers for market to mention but a few of the many applications.

Two electrical methods for rooting pot plant cuttings will be shown and three different uses of electric soil warming methods will be demonstrated in a range of frames. For the

amateur, a small greenhouse will be used to show how heating, ventilating, watering and pest control can be provided automatically. For the first time E.D.A. will show a battery electric lawn mower; an overnight charge gives about 1½ hours' continuous running on the 12in mower and 2½-3 hours on the 14in model.

### Funnel Floodlighting

A feature of the s.s. *Empress of Canada*, the latest Canadian Pacific liner, is the single floodlit funnel. The yellow surface is illuminated by eight 140 W Philips integral sodium lamps in "Renfrew" fittings, and the contrasting colours of the house flag are picked out by six 150 W pressed-glass tungsten reflector lamps.



Floodlit funnel of the "Empress of Canada"

### £5 MILLION ORDER FOR DIESEL LOCOMOTIVES

An order worth approximately £5 million has been placed by the British Transport Commission with the Clayton Equipment Co., Ltd., for 88 Type 1 diesel-electric locomotives. These locomotives will have a central cab and will be provided with twin generating sets, one at each end. The locomotives will be able to operate on one or on both generating sets. All-round accessibility to the machinery and vision from the cab will be outstanding features. Two Paxman engines, each of 450 h.p., will be fitted and the electrical equipment will be supplied by the General Electric Co., Ltd.

### Employment in Electrical Manufacturing

In the article on page 796 of last week's issue it should have been indicated that the figures in Table 1 are in thousands.



INDUSTRIAL NEWS *[continued]***E.T.U.'s Complex Rules**

**D**URING last week's hearing of the High Court action brought by two members of the Electrical Trades Union Mr. Justice Winn said that one could "piously pray for aid for branch secretaries who had to understand the rules." The more complex the rules got, the more likely was it that the union would be run by politicians.

In the action Mr. John Thomas Byrne and Mr. Frank Chapple are seeking a declaration that the election of Mr. Frank L. Haxell as general secretary in December, 1959, was void; and damages for conspiracy. The action is being brought against Mr. Frank Foulkes, Mr. F. L. Haxell, Mr. R. G. MacLennan, Mr. J. N. Frazer, twelve other members of the Executive Council, officials of the Union, and the Union itself. Defendants admit that Mr. Haxell's election was invalid but deny all allegations of conspiracy and fraudulent practices.

Plaintiffs' case was concluded with the evidence of Mr. Byrne and on Monday Mr. Neil Lawson, Q.C., opened the defendants' case. He said it was clear that there was no attack on the defendants in respect of their work for the Union. The leadership, particularly Mr. Foulkes, Mr. Haxell, and Mr. MacLennan, had built up the E.T.U. to a position of considerable

influence in the industry. What the Court was concerned with was really a struggle for power between conflicting groups. In such a struggle the groups used methods which seemed apt to achieve their ends. There was a world of difference between misunderstanding of rules, muddle, inefficiency, and lack of cohesion on one hand, and a fraudulent conspiracy on the other.

The first defendant to give evidence was Mr. Haxell. He said he had been a member of the Union for 32 years, a member of the Communist Party since 1935, and a member of the Communist Party Executive since 1947. He referred to the December, 1959, election, and explained that this had been organised and controlled by the assistant general secretary and the office manager. He knew nothing about any of the alleged irregularities.

The hearing continues.

**LOAN FOR INDIAN DEVELOPMENT**

Credit to the extent of £30 million is provided for in an agreement signed last week on behalf of the United Kingdom and Indian Governments. It will extend to 25 years and repayment is to begin in seven years' time; it will be used for purchases of equipment from the United Kingdom. Among the projects to which the credit is to be applied are a cable factory in West Bengal and the heavy electrical machinery factory at Bhopal, Madhya Pradesh.

**Pyrotanax Silver Jubilee**

Pyrotanax, Ltd., has been celebrating its silver jubilee. Guests from the company's Commonwealth factories and associated concerns have been entertained. The celebrations culminated in a silver jubilee dinner at the Royal Station Hotel, Newcastle-upon-Tyne, at which representatives of all sections were present with their guests.

**New Headquarters for Radiation Group**

**T**WO years ago Radiation, Ltd., decided to decentralise their various administrative offices and sales organisations from Central London and to accommodate them on a site adjoining the group's "Ascot" water heater factory at Neasden. The new building, Radiation House, is now completed and on Tuesday of this week the official opening ceremony was performed by the Minister of Power, Mr. Richard Wood. Also

present was Mr. Alfred Robens, chairman of the National Coal Board.

An imposing landmark, the building has 13 storeys, stands 170ft high and provides 30,000 sq ft of floor space. Since the work of Radiation, Ltd., is carried out by a series of departmental groups, the building is arranged so that each department is on top of the other—forming a series of departmental "trays." The building is square in plan with the access and service core running through the centre. The sculptural form of the "tray" formation has been achieved by setting the windows back from the marble wall face and thus achieving an attractive lightness of appearance. The architect was Mr. Dennis Pugh, A.R.I.B.A., and it is estimated that the building has cost £250,000.



Radiation House, the new head office of the Radiation Group

**David Brown Expansion Plans**

David Brown Industries, Ltd., are negotiating for the lease of a factory on the Pallion Trading Estate, Sunderland. Commenting on this proposal, Mr. David Brown, Jun., executive director, said that with their very full order book they badly needed more space to expand production; the Park Works site at Huddersfield was already completely built up. The Sunderland factory would be used initially for the manufacture of "Radicon" worm gear units, and they visualised that a labour force of approximately 400 would eventually be employed there.

**A.E.I. PROGRESS IN 1960**

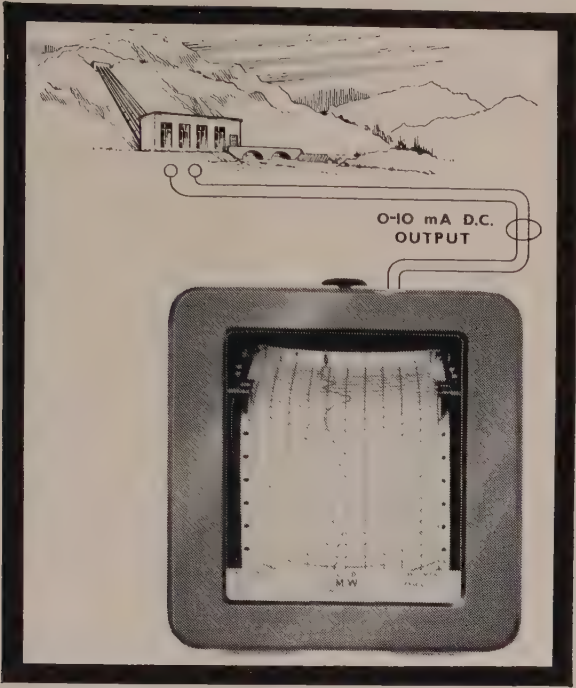
A well-illustrated 60-page brochure, "A.E.I. Review of Work and Progress in 1960," describes some of the work and orders received by the group's 18 engineering divisions and trading companies. The wide range of subjects is covered under four main headings: generation and supply; industry and commerce; transport; and science and medicine.

**Colour Television in Japan**

Mass production of colour television receivers, with a target figure of 1,000 sets a month by the end of this year, is being undertaken by the Tokyo Shibaura Electric Co. This was stated by the president of the company, Mr. Fumio Iwashita, when he visited London recently in the course of a seven-week trade tour of eleven countries. He said that regular colour television transmissions were started last September and there were now eight stations giving colour transmissions daily.



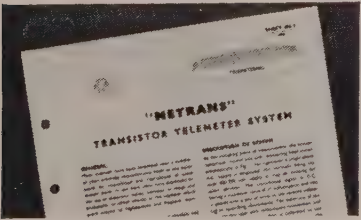
REMOTE RECORDING WITH  
THE METRANS TRANSISTOR  
TELEMETERING SYSTEM



Everett Edgcumbe developed the Metrans system to enable any information which can be converted to an electrical equivalent to be recorded or indicated remotely. An A.C. power supply drives the transmitting equipment which expresses the information as a variable D.C. current, which is fed into the milliammeter or graph recorder at the receiving end.

The system can transmit information over a 2-core telephone type cable for long distances, the only limiting factor being that the total resistance in the external circuit does not exceed 10,000 ohms. Normal accuracy is  $\pm 1\%$ , in spite of variations of mains supply voltage to the power unit of up to 25%.

Metrans systems are usually designed for the specific installation or application, though costs are kept low by using standard components. The Control Engineering Division is always pleased to discuss requirements. Sheet 496/1 outlines the principles of the system.



Please send  
for Sheet 496/1d

Other Products include : Timers • Synclock Motors • Metrac • Metrohm • Battery Charge Indicators • Recorders



EVERETT EDGCUMBE & COMPANY LTD.  
COLINDEEP LANE • LONDON • N.W.9.  
Telephone: COLINDALE 6045.  
BRANCH OFFICES: BIRMINGHAM, CARDIFF,  
GLASGOW, LONDON, MANCHESTER,  
NEWCASTLE, SHEFFIELD.



# PIRELLI-GENERAL

## concentrates

- \* research \* development
- \* manufacture
- \* sales \* installation
- \* service

**in the most compact  
manufacturing plant—**

covering over one million square feet  
at the twin PIRELLI-GENERAL works at  
Southampton and Eastleigh.  
... in the most modern manufacturing plant,  
completely self-contained,  
with the fullest resources for research  
and development.  
... the widest range of products,  
from super-tension oil-filled cables  
for the most arduous duties,  
to wire so thin that five miles of it  
weighs only one pound!





**PIRELLI-GENERAL**

**for sales and service**



*best way to buy*

GENERAL WIRING CABLES

IMPREGNATED PAPER CABLES

SUPER-TENSION OIL-FILLED CABLES

TELECOMMUNICATION CABLES

RADIO, T.V. AND H.F. CABLES

PLASTIC POWER CABLES

CABLE ACCESSORIES

SHIPWIRING CABLES

MINING CABLES

CABLES FOR RAILWAY ELECTRIFICATION

AIRCRAFT CABLES

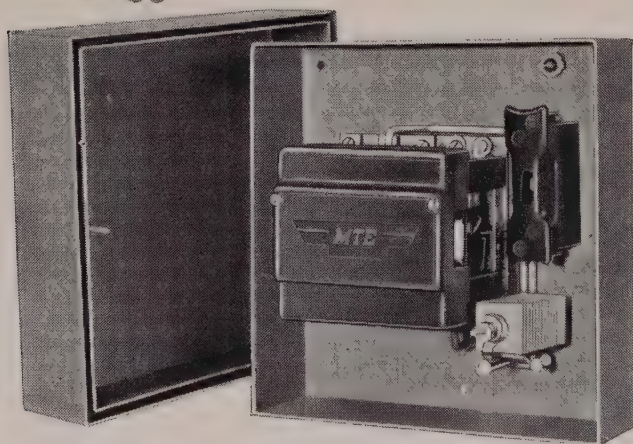
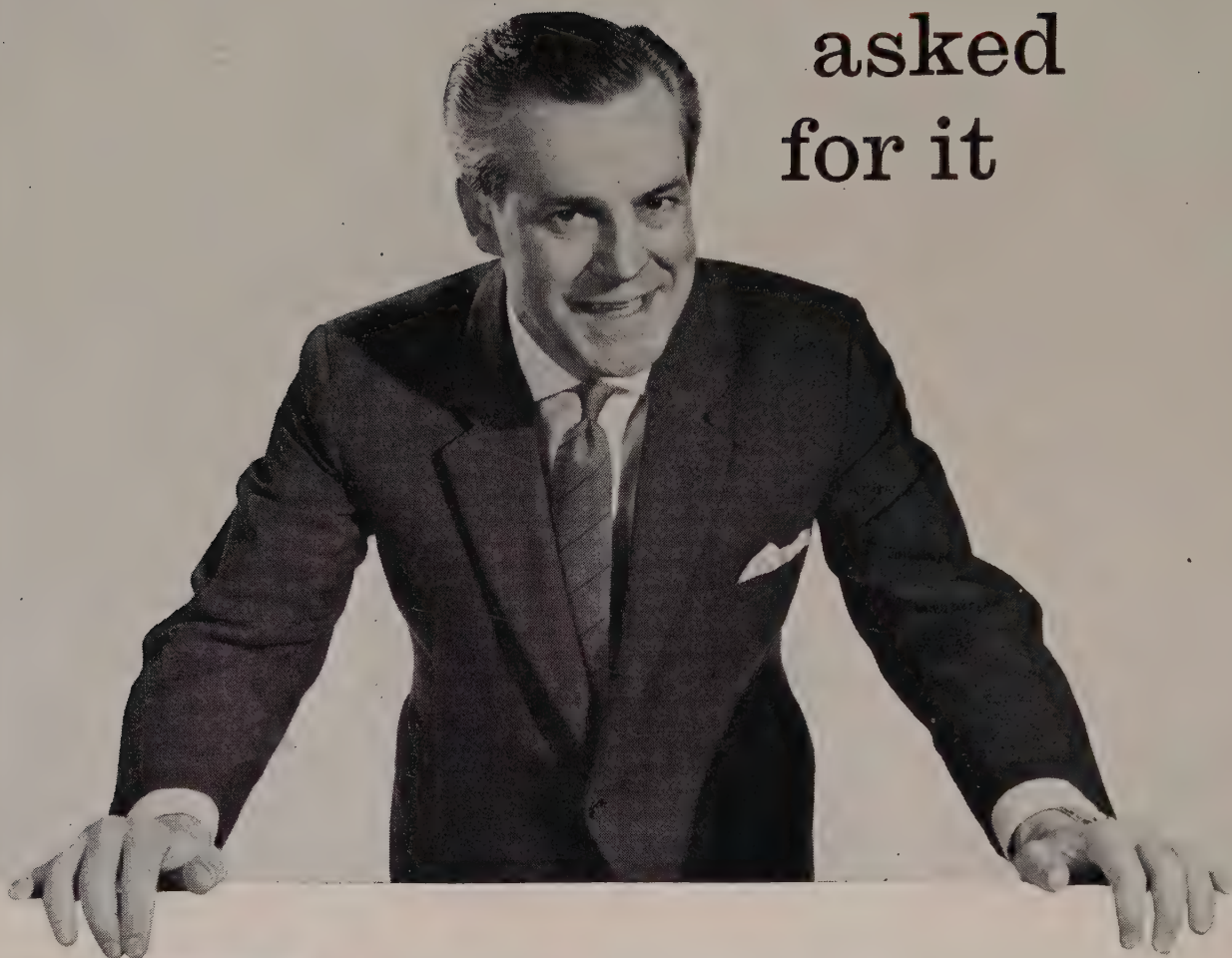
COVERED CONDUCTORS

SELF-SUPPORTING AERIAL PILOT CABLES

PIRELLI-GENERAL CABLE WORKS LIMITED • SOUTHAMPTON AND EASTLEIGH



**You**  
asked  
for it



For full specification and information on available extras and user experience, you should write now for M.T.E. Heating Contactor Leaflets.

You want contactors that meet all the requirements of electrical heating circuits and M.T.E. have developed just that. Customer experience, built up over the years, has proved the dependability of M.T.E. contactors—now this special development is being produced to simplify the selection and installation of contactors for heating control.

Covering the range from 15 to 150 amps, M.T.E. Heating Contactors are available in single, double and triple-pole form, all contacts are fully protected by an arc barrier and cover in Alkyd moulding. Compact, heavy duty, unit constructed M.T.E. contactors are silent in operation and fully comply with BSS.775 (1956). Front access and front wiring make for easy installation, whilst sheet steel dust and damp protecting enclosures incorporate knock-out conduit entries at top and bottom.



**M.T.E. CONTROL GEAR LIMITED · Leigh-on-Sea · Essex · Southend 524281**



INDUSTRIAL NEWS *[continued]*

## Approved Appliances

THE British Electrical Approvals Board for Domestic Appliances has announced the approval of nine electric shavers and one toaster in the second group of appliances to be brought into the new national proving scheme. Other applications are still under consideration but were not received early enough for inclusion in this initial announcement. Certifi-

### Scottish Cable Contracts

Orders for five miles of 275 kV and 15 miles of 132 kV pipeline compression cable have been placed with Enfield-Standard Power Cables, Ltd., by the South of Scotland Electricity Board. The 275 kV cable, the largest installation at this voltage in Great Britain, will supply the new Ravenscraig steel strip mill being erected by Colvilles, Ltd., in Lanarkshire, and the 132 kV cables are required for reinforcement of the supply system in Glasgow. These contracts, which include auxiliary cables and installation, have been awarded at intervals over the last 12 months and are valued at £640,000.

### NEXT STAGE OF SNOWY SCHEME

The Canberra correspondent of *The Times* reports that the Australian Government has authorised the Snowy Mountains Authority to call for tenders for the next major stage of the scheme, which will include three tunnels totalling 31 miles, three dams, and a 760 MW power station, the largest in the scheme. The first units of this station are expected to come into operation in 1966.

The diversion of the waters of the Eucumbene, the upper Murrumbidgee, and the Tooma rivers into the Tumut river has been completed.

### Rutherford Laboratory

The Atomic Energy Authority and the National Institute for Research in Nuclear Science have agreed that the development of particle accelerators hitherto carried out by the Accelerator Division, A.E.R.E., Harwell, should be the responsibility of the Rutherford Laboratory of the National Institute for Research in Nuclear Science. Mr. L. B. Mullett, head of the Accelerator Division, has joined the Rutherford Laboratory as assistant director for accelerator and applied physics. Other appropriate staff transfers have already taken place.

cates allowing the use of the BEAB mark have also just been issued in respect of a further six radiant fires and six vacuum cleaners. The initial announcement of approvals in this group was made on 1st March.

BEAB is extending its scope steadily and is now able to consider for approval radiant fires, kettles, vacuum cleaners, shavers, toasters, coffee percolators, washboilers, hair dryers and irons. A consolidated list of approved appliances is planned for publication at the end of the year and will be made available to dealers and others interested through their appropriate associations.

### HEATING AND VENTILATING YEAR BOOK

The "Year Book of the Heating and Ventilating Industry" for 1960-61 has recently been published by Techni-trade Journals, Ltd., 11-13, Southampton Row, London, W.C.1, price 15s. In addition to a comprehensive 211-page buyer's guide, there are lists of trade names, manufacturers' addresses, technical and trade associations and consulting engineers. The book also includes articles on design problems of radiant heating, the thermal behaviour of a building, boiler water treatment and a contractor's review of the period covered by the publication. There is also a heating and ventilating literature index, a selected list of relative British Standards and articles dealing with trading and employment of interest to those concerned with this industry.

### REMPLOY'S FIRST LONDON SHOWROOM

MORE than 300 different products made by the severely disabled are on view at the new London showroom of Remploy, Ltd., at 22, Bruton Street, W.1. The premises provide over 2,000 sq ft of uninterrupted show space on one floor and items from many of Remploy's 90 factories are on view. Apart from furniture, the largest single trade followed by Remploy, there is a section devoted primarily to electrical products from the Engineering Group. Items displayed include

a range of reflector fires, immersion heaters, tubular heaters and various electric elements.

The showroom is controlled by Mr. F. H. Hawes (South East Area sales manager) and Mr. T. J. Brawn is manager. Although intended mainly for trade buyers, the showroom is open to the general public who can place orders through retailers. Opening times are from 9.30 a.m. to 5.30 p.m. Monday-Friday and until 12.30 p.m. on Saturday.

### Train Washing at Ilford

An automatic train washing plant is now being used by British Railways at the Ilford car sheds. The plant can be arranged to pre-wet a train of carriages, spray them with cleaning solution and wash with felt flails as they pass through the installation at 3 m.p.h. The carriages are then reversed through the plant for a final wash. The automatic control system for the complete cleaning cycle has been supplied by Brookhirst Igranix, a company in the Metal Industries Group





INDUSTRIAL NEWS *[continued]*

## TUBE HEAT TREATMENT INSTALLATION

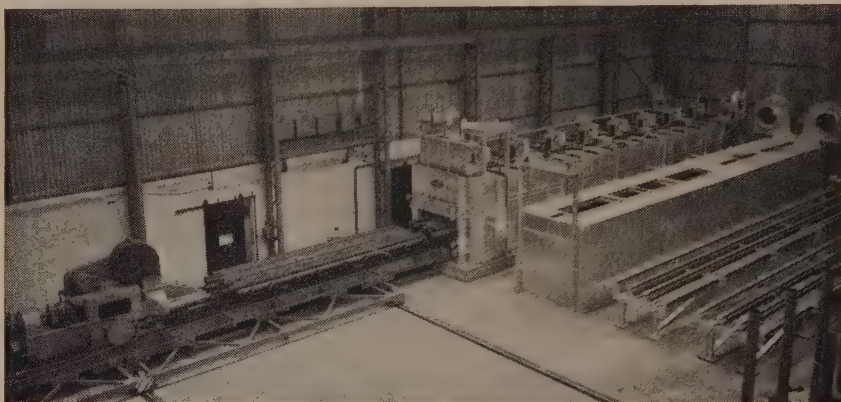
**A**N atmosphere controlled batch furnace and charging machine for the specialised heat treatment of tubes has recently been installed at the Bromford Works of Stewarts & Lloyds, Ltd., by Metaelectric Furnaces, Ltd., and the Incandescent Heat Co., Ltd. The furnace has an electrical rating of 1,000 kW, a maximum operating temperature of 1,000°C and is capable of accepting a 15-ton charge of tubes having a maximum length of 50ft.

To achieve the close temperature uniformity required, the heavy-duty heating elements are controlled in five separate sections, or zones, along

the length of the furnace chamber. To further ensure temperature uniformity during heating and cooling, air circulation fans are mounted in the heating chamber roof. The wide range of critical cooling speeds of the various tube-steels is covered by incorporating furnace cooling with or without pro-

TECTIVE atmosphere, charging machine air-blast cooling and a cooling chamber capable of accelerated or retarded cooling.

The necessary protective atmosphere is provided from a nitrogen generator having an output capacity of 3,500 cu ft/hr. This generator produces nitrogen by the combustion of town's gas and air and then removing both CO<sub>2</sub> and water vapour after combustion to give a resultant atmosphere of approximately 99 per cent pure nitrogen.



*Furnace and charging machine for tube heat treatment*

## EDUCATIONAL PUBLICATIONS

The contents of Parts I and II of "Simple Oscilloscope Measurements," published as separate booklets by the Mullard Educational Service, have now been combined in a single publication. This new addition to the "Simple Measurement Series" contains suggestions for 37 different experiments, which can be carried out using a simple oscilloscope. The experiments have been chosen to cover the syllabuses of schools, and the first year at technical college.

The latest pamphlet in the series, "Demonstrations and Experiments in Electronics," describes a simple low voltage power supply which will be useful to schools conducting experiments with transistor circuits. The circuit is essentially a simple half-wave rectifier supplied from the secondary of a mains transformer delivering 30 V r.m.s. The rectified output is applied to a variable filter network which enables a range of currents from 1 mA to 1.4 A at an output of 10 V to be obtained. Currents of up to 1.9 A can be drawn at lower output volts. Both publications are now available, free of charge, to schools, technical colleges, and other interested organisations from the Mullard Educational Service, Mullard House, Torrington Place, London, W.C.1.

### London Airport Hotel Emergency Lighting

Emergency lighting equipment for the new Ariel Hotel at London Airport has been supplied by Nife Batteries. The battery consists of 200 cells with a capacity of 45 Ah, capable of maintaining a load of 3.2 kW for three hours.

## Fractional Motor Conference Report

THE Fractional Motor Conference, in its annual report, records an extension of services to its members by increasing the interchange of information in technical and production spheres relating to home and overseas markets. Considerable emphasis has also been placed on the development of national and international standards.

The report states: "This expansion of activity accords with the aim of the conference to improve the efficiency of the industry and to provide commercial information comparable to that available to electrical industries overseas. It is the view of the conference that co-operation founded on mutual confidence offers the best prospect of improving efficiency of

marketing and production and of obtaining a larger share of world markets."

Total production of the fractional horsepower motor industry in 1960 exceeded £13.5 million. This was about £1.4 million less than in 1959—largely as a result of the recession in the domestic appliance field. Direct exports accounted for 20 per cent of production in 1960.

## ALUMINIUM DATA BOOKLET

A 67-page booklet giving technical data on aluminium and aluminium alloys has been produced by the Imperial Aluminium Co., Ltd., P.O. Box 216, Witton, Birmingham, 6. The booklet is in four parts, covering pure aluminium, aluminium alloys not suitable for heat treatment, aluminium alloys which may be heat treated, and brazing materials and other products. The booklet is completed by a series of weight tables and tabular information on other mechanical and electrical properties.

## Large Electrode Boiler

An order for a large electrode hot water boiler has been received by Bastian & Allen, Ltd., a division of the Parkinson Cowan group. It will be rated at 18,000 kW, operating at 13.2 kV, with an output of 60,000,000 B.T.U.'s under a working pressure of 350 p.s.i. and delivering water at 380°F. The boiler is for the Iron Ore Company of Canada at their Carol Lake project in Newfoundland.

## South of Scotland Digest

A booklet, "Things You Should Know," produced by the South of Scotland Electricity Board provides in a handy form a digest of the Board's report and accounts for 1960 and information on the Board's activities generally.



## Technical Training Week

AT the end of May, Commonwealth Technical Training Week begins in Britain and many other parts of the Commonwealth. The idea, which came from Prince Philip, is to stress the importance of vocational training for young people. Despite the use of the word "technical" in the official title, it is not confined to apprentices, apprenticeship schemes or industrial training. Neither is it a campaign to encourage skilled workers to emigrate, nor a labour recruitment drive. It embraces all forms of vocational training and education, including agriculture, commerce and the professions.

Each of the 37 Commonwealth countries, including Britain, taking part in the Week is responsible for its own arrangements. In Britain, Prince

Philip asked the City and Guilds of London Institute, of which he is president, to be an overseeing, co-ordinating body. Detailed organising of the Week in the United Kingdom is in the hands of local authorities. Almost all county councils and county boroughs have asked their education committees to be responsible. The

actual arrangements are in general being made by youth employment committees or technical colleges.

Throughout Britain there will be civic functions, careers exhibitions and conventions, open days at colleges and large industrial concerns, exhibitions of work, prize-givings, sports and social functions, shop window displays, film shows and lunch receptions to outstanding youngsters. In London, an exhibition will be held at the Royal Exchange.

## Automation in the Steel Industry

AN order has been received by Honeywell Controls, Ltd., from the Continuous Casting Co., Ltd., for the complete instrumentation of a twin-strand continuous casting machine to be installed at the Abbey Works of the Steel Company of Wales. The

machine will be instrumented by a new integrated two-wire electric system known as the "ElectriK Tel-O-Set." The system will control and record the flow of cooling water and lubricant at various points, and will monitor certain local flows; it will record and integrate the casting speed and record temperature rises across the moulds. Provision is made for a Honeywell data handling unit to be fitted later.

The "ElectriK Tel-O-Set" system was introduced earlier this year and the company has already received a £300,000 order incorporating it for the 720-mile Northern India pipeline project.

## Circuit-Breakers for Cardiff Substation

THE General Electric Co., Ltd., has been awarded an £83,000 contract by the Central Electricity Generating Board for five 132 kV 3,500 MVA oil circuit-breakers to replace existing units in the Cardiff East substation. A feature of these units is that they will be required to operate satisfactorily even when flooded to a depth of 4ft. This will necessitate the placing of each circuit-breaker operating cubicle on a steel girderwork platform

and as a result the operating cubicle and the drive rod of the circuit-breaker operating mechanism will have to be modified.

## Russian Plant for Iraq

A report from the Baghdad correspondent of *The Times* states that contracts have been signed by the Soviet Union and the Iraq Government for the provision by the Russians of factories for making agricultural machinery and electrical plant. The electrical factory, which is estimated to cost over £3 million, will produce power transformers, motors and electrical appliances "which are expected to compete with foreign goods in price and quality." It is planned to begin production in 1963.

## Liquid Earthing Resistors

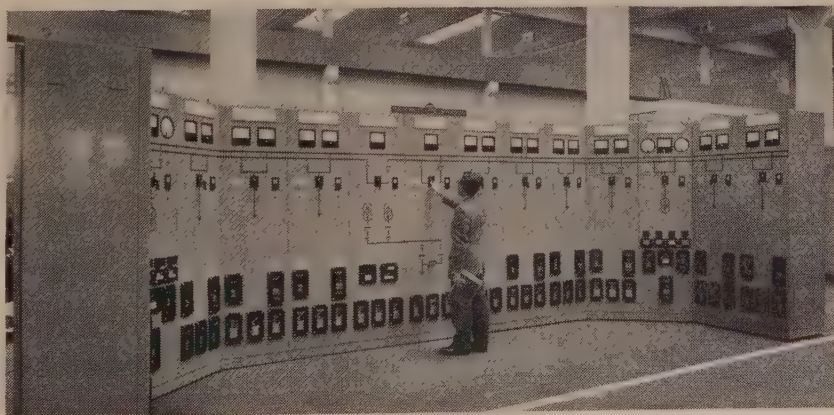
A new publication issued by the Engineering Group of the General Electric Co., Ltd. (Technical Description No. 475), describes the company's liquid earthing resistors which range from 600 A at 6.6 kV or 400 A at 11 kV to 2,000 A at 33 kV or 900 A at 66 kV. These resistors have a negative temperature coefficient which allows the fault current to increase with increasing electrolyte temperature.

## Pumps for Japanese Nuclear Station

Hayward Tyler & Co., Ltd., are to supply eight low pressure and eight high pressure glandless circulating pumps for the G.E.C./Simon-Carves nuclear power station under construction for the Japanese Atomic Power Co. at Tokai Mura. The value of the contract is about £50,000.

## Contact Rivet Data

A revised data sheet describing their standard range of contact rivets has been produced by Johnson, Matthey & Co., Ltd. The entire range is normally stocked in silver and in addition a limited range of sizes is now stocked in platinum, palladium, 40 per cent copper-palladium, 40 per cent silver-palladium, 10 per cent iridium-platinum, and Elkonite D54X. Recommendations are made regarding the shank lengths required for riveting to various thicknesses of contact support. Copies are available free on request to the company at 73-83, Hatton Garden, London, E.C.1.



Fifteen-panel control board recently completed at the Blackwood, Mon., factory of South Wales Switchgear, Ltd., for the Kuwait Government. A number of switchboards are being supplied under the contract and the board illustrated is designed for the control of one of them—a duplicate busbar, air insulated, metalclad switchboard incorporating solenoid-operated oil circuit-breakers with a capacity of 500 MVA at 11 kV



## INDUSTRIAL NEWS [continued]

## TRADE ANNOUNCEMENTS

A Northern Computing Service, available for industrial, scientific and commercial calculations, has been set up in Manchester by **Ferranti, Ltd.** Initially this service will be based on a "Pegasus" general-purpose digital computer at the company's head office at Hollinwood.

The Maidstone branch office of the **A.E.I. Woolwich Group** ceased to operate on 28th April and its activities are now undertaken by the group's branch office at 33, St. Dunstons Street, Canterbury (telephone: Canterbury 5332/5). The Canterbury branch, which already handles the products of the A.E.I. Cable Division, is now also distributing A.E.I. Radio and Electronic Components Division products, and will cover the whole of the Kent area. The branch remains under the management of Mr. W. R. Morley. Mr. R. V. Banks, who has been managing the Maidstone branch, will remain at Maidstone to supervise sales promotion in the Kent area. His address is 9, Market Buildings, Maidstone (telephone: Maidstone 55571).

The north-eastern sales offices of **Enfield-Standard Power Cables, Ltd.**, Enfield Rolling Mills, Ltd., and London Zinc Mills, Ltd., are now at 8, North Terrace, Claremont Road, Newcastle-upon-Tyne (telephone: Newcastle 21472).

The head office of **A. S. Duran & Co., Ltd.**, electrical wholesalers, is now at 30, Kings Road, Reading (telephone: Reading 55513). The new five-storey building will be the headquarters of the electrical wholesale division of the

group (Cozens & Sutcliffe Holdings, Ltd.) including the Southampton and Walton-on-Thames branches and RJS Services, Stoke-on-Trent.

**Electronic Instruments, Ltd.**, of Richmond, Surrey, are to produce and market the Hardicon residual water hardness detector under an agreement with William Boby & Co., Ltd. The fully automatic detector tests water by means of a photo-electric cell. When hardness is detected the instrument sounds an alarm or automatically shuts down the plant.

**Crofts (Engineers), Ltd.**, have appointed Mr. John R. Mitchell as technical representative for the Sheffield area. He can be communicated with c/o the Sheffield office, 12, Collegiate Crescent, Sheffield, 10 (telephone: 65792).

**Berec International, Ltd.**, the export sales organisation of the Ever Ready Co. (Great Britain), Ltd., has joined with the Cie. Industrielle des Piles Electriques (CIPEL) of Argenteuil to form Berec France S.A.R.L. (Last year the Ever Ready Co. (Great Britain), Ltd., announced that a substantial minority interest had been acquired in CIPEL.) From their offices at 125, rue du Président-Wilson,

Levallois-Perret, Seine, France, the new company will supply "Berec" flashlight batteries and radio batteries to all territories within the franc area.

**Evans Electroelenium, Ltd.**, manufacturers of "EEL" photo-electric instruments, are now represented in Scotland by Electricals (Laboratory), Ltd., 3a, St. Vincent Street, Edinburgh, 1, who are responsible for sales. Servicing is in the hands of Scientific Instruments (Glasgow), Ltd., Landsdowne House, 154-156, Grovepark Street, Glasgow.

**Lec Refrigeration, Ltd.**, of Bognor Regis, Sussex, have recently opened a northern depot at Roker Park Estate, Gould Street, Oldham, Lancs. The depot will serve Lancashire and Yorkshire and will be in charge of Mr. W. Pickup, the northern supervisor.

As from 15th May the new address of the London office of the **E.M.B. Co., Ltd.**, of West Bromwich, will be 168, Park Street Lane, Park Street, St. Albans, Herts. (Mr. P. N. Jay).

The **Cable Jointing & Erection Co.** has moved from Pavilion Buildings, Trent Bridge, Nottingham, to 69, Dame Agnes Street, Nottingham.

The London office and showroom of **G. P. Dennis, Ltd.**, and **Trunduct, Ltd.**, are now at 70, High Road, Chiswick, W.4 (telephone: Chiswick 1486).

## New Morphy-Richards Heaters

AT a series of heating exhibitions to which the trade have been invited in London and twenty other centres, Morphy-Richards are making an

advance announcement of two new heaters which they plan to introduce this autumn. These are a free-standing infra-red heater and a combined infra-red convection heater.

The free-standing model has a loading of 1 kW and will be available in October and first deliveries of the other heater, the "Radiant Derwent," are scheduled for early September. The last named is a development of the company's "Derwent" range of convectors and it will combine a 750 W infra-red element with a 2 kW thermostatically controlled convection unit. The retail prices, including purchase tax, are provisionally announced at £4 19s 6d (1 kW model) and £14 14s.

### WATFORD CONTRACTORS' JU3'LEE

As part of the 50th anniversary celebrations of J. W. Russell, Ltd., electrical engineers and contractors, Watford, the directors have arranged for the entire staff of some 200 to be flown to Ostend where they will spend the week-end, returning on Sunday.

## Japanese Nuclear Power Project

A FURTHER stage in the progress of the construction of Japan's first nuclear power station was marked recently when the site offices of the British General Electric Co. of Japan, Ltd., at Tokai-Mura were officially opened. The ceremony was performed by the British Ambassador, Sir Oscar Morland. About 200 guests were present, including senior representatives of the Japan Atomic Power Company, the First Atomic Power Industrial Group, the British Chamber of Commerce, and Central and Ibaraki Prefectural Government officials. In declaring the site office open, Sir Oscar Morland indicated the reasons for the development of nuclear power in countries such as Britain and Japan.

He praised the partnership which existed between the British and Japanese companies which went a long way to prevent cut-throat competition.

### Electricity and Potato Husbandry

At the 1960 Rural Electrification Conference organised by the Electrical Development Association a paper on "Electricity and Potato Husbandry" was read by Mr. P. T. G. Twiss, B.Sc.(Agric.), of the Agricultural Research Council. This paper has now been issued in the form of a quarto 12-page illustrated brochure (E.D.A. No. 1965), copies of which can be obtained from the Association at 2, Savoy Hill, London, W.C.2.



## E.R.A. ANNUAL LUNCHEON

**T**HE annual luncheon of the British Electrical and Allied Industries Research Association was held at the Savoy Hotel, London, on 3rd May, preceded by the fortieth annual general meeting at which the annual report of the Association for 1960 was presented. This report was reviewed in last week's issue.

When he proposed the toast to the Association, Mr. F. J. Erroll, Minister of State, Board of Trade, stressed the importance of research and said that the expenditure of the electrical industry on research was far above the average for the whole of British industry. Research and development in electrical engineering and electronics represented, in 1958, 30 per cent of British industry's total expenditure on research. The electrical industry employed 20 per cent of all scientists and engineers in manufacturing industry, and one in four of all engineers leaving the universities were electrical. This massive deployment of money and brain power certainly got results.

The reply was made by Mr. J. R. Beard, president of the Association, who said that Mr. Erroll obviously realised that the export trade not only required the highest class of salesmanship, but also that the goods to be sold should be capable of standing up to world competition, in quality, design and up-to-dateness. These were all matters which could be aided by research and we had fortunately reached a stage when this fact was becoming widely appreciated. Things were very different when the E.R.A. was first formed. However, there was now general agreement as to the importance of research and acceptance both by the Government and industry of the need to contribute to this essential work. The important thing for the E.R.A. was to see that the necessary funds were available and that they were directed to the right objectives. To achieve



Left to right: Mr. F. J. Erroll, Minister of State, Board of Trade; Mr. J. R. Beard, president of the Association; and Mr. O. W. Humphreys, chairman of the Council

this the senior executives in industry must be encouraged to take a deeper interest in the Association's work and to appreciate that their participation in it was financially beneficial to their organisation.

Finally, a toast to the president was proposed by Mr. O. W. Humphreys, chairman of the Council. He said that during the past three years he had become increasingly convinced of the urgent necessity for a major reorientation of thinking and a drastic overhaul of administration if the E.R.A. was to continue and to expand the services it gave to the electrical industry and to maintain its high reputation. He was convinced that they would not attain the high objectives which they had set themselves until they turned their minds from the collecting of subscriptions to the selling of research.

## COMMISSIONS IN NAVAL ENGINEERING

**T**O meet the growing need for qualified technical officers in the Royal Navy the Admiralty announces the introduction of direct graduate entry. Until now the only avenue to a General List commission, direct from civilian life, has been via the Dartmouth cadet entry between the ages of 17 and 19. Under the new scheme university graduates with suitable engineering degrees or degree equivalents, up to the age of 25 years, may be awarded General List commissions in naval engineering.

Officers entering the Navy under the scheme will serve within the new technical officer structure created by the recent amalgamation of the engineering and electrical specialisations into a single engineering specialisation. Under the amalgamation, which becomes effective on 1st July, engineer officers, both mechanical and electrical, will serve together in one of four groups within the Fleet (Marine Engineering, Weapons and Radio Engineering, Submarine Engineering or Air Engineering).

Entries will be made once a year, in September, successful candidates entering as acting sub-lieutenants. Officers will be confirmed in the rank of sub-lieutenant after ten months and promoted acting lieutenant 18 months after

entering the Royal Navy. Confirmation in this rank follows on the satisfactory completion of training. Promotion to lieutenant-commander is attained after eight years' seniority as lieutenant and advancement to commander and higher ranks is by selection, in competition with other General List officers.

Regulations and application forms may be obtained from the Director of Naval Recruiting, Officer Entry Section, Admiralty, Queen Anne's Mansions, London, S.W.1.

### I.E.E. Annual Report and Accounts

Copies of the annual report of the Council of the Institution of Electrical Engineers for session 1960-61 and of the accounts for the year ended 31st December, 1960, can now be obtained by members on application to the secretary. The annual general meeting on 18th May will be followed at approximately 6.30 p.m. by a lecture by Mr. J. A. Ratcliffe, C.B.E., M.A., F.R.S., on "Experimental Investigation of Space."



## NEW ELECTRICAL EQUIPMENT

### WIRE STRIPPING SOLUTION

The introduction of a solution, "Wire Stripper 493," for removing baked enamel insulation and synthetic coatings from wire or windings and from vertical or other large surfaces, is announced by ROTO-FINISH, LTD., Mark Road, Hemel Hempstead, Herts. The stripper is applied to the coating to be removed, which is left until it lifts, and then wiped clean. Roto-Finish "493 Diluent" is used to adjust the viscosity of the stripper when very thin wires are being stripped or when the 493 stripper becomes too viscous through long exposure.

### FLAMEPROOF CONTACTOR STARTER

The type DS.3 air-break direct-on-line contactor starter announced by the BELMOS CO., LTD., Bellshill, Lanarkshire, is rated at 150 A up to 650 V and complies with B.S. 587:1957 for motor starters and B.S. 229:1957 for flameproof enclosures; it is certified flameproof for Groups 1, 2 and 3 gases. The busbars are of rectangular copper section and have a continuous rating of 200 A, although busbars of 400 A rating can be provided. A 200 A isolator is mounted with the busbars as a unit. The standard model is designed for on/off operation but a reversing isolator can be fitted if specified. The triple-pole contactor is rated at 150 A in terms of B.S. 775:1956 and is generally suitable for motors up to approximately 120 A full load current.

Overload protection can be provided

either by solenoid-operated relay with oil dashpots or by a thermally-operated relay. Under-voltage protection is inherent in the electrically-retained contactors, while earth leakage protection, when specified, is provided by a ring type core-balance transformer and relay, visual warning of tripping being given by a flag indicator on the front of the unit. Short-circuit protection can be provided, when required, by h.b.c. fuse-links rated for Category AC5 duty in accordance with B.S. 88:1952, giving a rupturing capacity of 35 MVA. Push-button control is provided on the unit and if desired can be arranged for operation from a remote point. A flameproof ammeter and/or voltmeter can be fitted.

### ELECTRODYNAMIC MATERIALS TESTER

A non-destructive materials testing instrument is announced by CAWKELL RESEARCH & ELECTRONICS, LTD., Scotts Road, Southall, Middlesex, a member of the Simms group of companies. This is the electrodynamic materials tester type SCT 4, which covers a range from 100 c/s to 10 kc/s with a calibration accuracy of  $\pm 0.1$  per cent. The instrument gives an accurate measurement of the resonant frequency of a regularly shaped specimen. From this reading and a knowledge of the dimensions and density of the sample, the elastic constants (Young's modulus, modulus of rigidity and Poisson's ratio) may be calculated. The measurement is non-destructive and the effect of subsequent treatment

of the material, such as irradiation in an atomic reactor, may readily be ascertained.

### PUSH-BUTTON AND INDICATOR LAMP

A range of push-buttons and transformer operated indicating lamps suitable for mounting on any form of switchboard, control desk or panel, is now being produced by EVERETT EDGUMBE & CO., LTD., Colindale Works, Colindeep Lane, Hendon, London, N.W.9. These accessories are of the one-hole-fixing type. The push-buttons are rated at 5 A 600 V, are available with projecting or flush buttons, and are oiltight. Provision can be made for "locking off" by turn-button or by a built-in barrel lock. Each indicating lamp has a small single-phase step-down transformer built in to the assembly, the output voltage to the lamp being only 12 V. This enables a miniature lamp to be used with a consumption of 2.2 W. The transformer can be supplied suitable for primary voltages of 100/125, 200/250, 400/440 or 500/550 V. Unbreakable lenses in Diakon are available in five colours, the lens being removable to permit lamp replacement from the front.

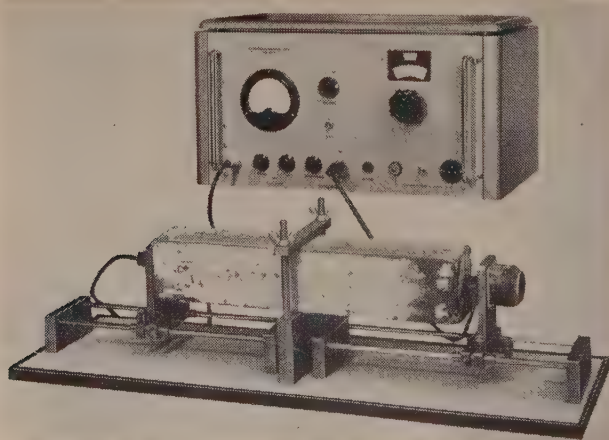
### ADJUSTABLE CAPACITOR

An adjustable polystyrene capacitor has been introduced by SUFLEX, LTD., 54, Uxbridge Road, London, W.5. The unit is in a hermetically sealed case 2in by 2in by 1½in with a range of 0.45 mF continuously variable to 0.5 mF. The adjustment is by an Allen screw and the accuracy is within 0.1 per cent. Other values, with a 10 per cent variation of capacity, are also available.

### REFERENCE BATTERY

The production of a mercury low impedance type voltage reference battery is announced by MALLORY BATTERIES, LTD., Dagenham, Essex. Since no glass is used in its construction, the battery can withstand brief short circuits, severe vibration and physical shock without damage. It operates in any position and is fully portable, being supplied in a leatherette carrying case.

Two sizes are available—a single



Cawkell non-destructive materials tester



cell 1.35 V battery, and one with eight outputs from 0 to 10.8 V in 1.35 V increments. Accuracy of  $\pm\frac{1}{2}$  per cent of stated open circuit voltage is claimed; temperature stability is within 1 per cent from  $-20^{\circ}\text{F}$  to  $+160^{\circ}\text{F}$  at drains up to 100  $\mu\text{A}$ . The battery is guaranteed for two years. Prices are £4 for the single cell, £10 for the multi-voltage unit.

### FREQUENCY/CAPACITANCE METER

The portable, battery powered meter type MM 1009, recently produced by SOLARTRON LABORATORY INSTRUMENTS, LTD., Cox Lane, Chessington, Surrey, gives direct readings of frequency from 0.100 c/s to 0.100 kc/s and capacitance from 0.1,000 pF to 0.0.3  $\mu\text{F}$ . As a frequency meter it has a  $\pm 3$  per cent measuring accuracy on five ranges up to 10 kc/s and  $\pm 5$  per cent on the two ranges above. These accuracies hold for a 2:1 spread in mark/space ratio. The input signal, 100 mV-150 V r.m.s. amplitude, is limited and fed into a pulse counting type integrator circuit.

As a capacity meter the instrument covers the range 0 to 0.3  $\mu\text{F}$  in six ranges with a  $\pm 2.5$  per cent accuracy maintained over the battery range of 12 V to 8 V. The unknown capacitor is compared with the internal standard by substitution in the integrator circuit. Suitably chosen standards thus provide accurate direct readings of capacitance. The range is easily extended to 1.0  $\mu\text{F}$ . The meter uses semiconductor devices throughout and is powered by eight U2 cells (International Standard) or equivalent. The overall dimensions are 6 $\frac{1}{2}$ in by 9 $\frac{1}{2}$ in by 5 $\frac{1}{2}$ in and the weight is 6 lb.

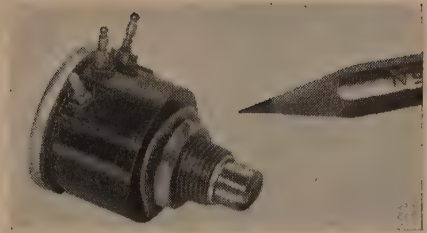
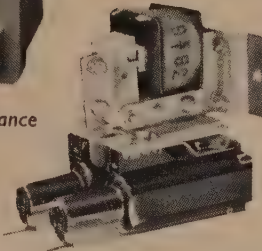
### VACUUM SWITCH RELAY

Another vacuum switch relay for a.c. or d.c., types J.55 and J.05, has been added to the range produced by B. & R. RELAYS, LTD., Temple Fields, Harlow, Essex. The relay may be fitted with either one or two make or break vacuum switches, although where only one vacuum switch is required, standard silver contact assemblies may be incorporated. The vacuum switches are operated by the electro-mechanical operation of the relay itself. Connection is made

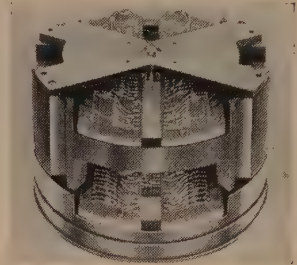


Solartron frequency/capacitance meter

B. & R. Relays vacuum switch relay



General Controls miniature wire-wound control



Ketay shaft-position encoder

through a metal diaphragm sealed inside the glass envelope of the switch. Switching rate is three operations per second and the relay weighs approximately 8 oz.

### COMPONENT PRINTING MACHINE

The model FA-72 automatic printing machine added to the range produced by REJAFIX, LTD., 81-83, Fulham High Street, London, S.W.6, is intended primarily for printing on electrical components with coaxial wire leads. Articles are loaded by hand into a magazine chute from a platform provided. They are controlled in the chute by the ends of their bodies, and slide down on the wires, which need to be reasonably straight. At the bottom of the chute two feeding wheels take the articles one at a time from the chute and present them to the printing pad, where they are printed by an offset (transfer) process and ejected on to a conveyor belt. The machine will handle articles having dimensions of  $\frac{1}{8}$  to 3 $\frac{1}{2}$ in body length, 0.08 to  $\frac{1}{8}$ in diameter and with a maximum length of wire protruding at each end of 2 $\frac{1}{2}$ in. Any printing area up to the maximum of 3 by 2 $\frac{1}{2}$ in is available. When modified for handling cylindrical articles without wires, the machine will take objects from  $\frac{1}{16}$  to  $\frac{1}{4}$ in in diameter up to the maximum length of 10in. The output of the machine is up to 3,600 articles per hour.

### SHAFT-POSITION ENCODERS

Recently introduced by the Norden Division of the United Aircraft Corporation and now available in the U.K. through KETAY, LTD., Eddes House, Eastern Avenue West, Romford, Essex, is a new range of shaft-position

encoders. Applications of these devices embrace machine tool control, film readers and navigation devices. The type ADC-36BCD encoder provides 360 discrete counts per rotation of the input shaft, numerical indication of shaft position being given in degrees in 8-4-2-1 binary coded decimal code. Self-selecting V-brush logic is incorporated, so obviating the need for extensive external brush selection logic circuitry. The encoder is contained in a size 33 standard U.S. Bu-Ord synchro mount through the use of the split-bit technique.

The type ADC-5-BCD (1,000) unit is capable of 100,000 counts in only 100 turns of the input shaft. The third type, providing 1,024 counts per shaft rotation, is contained in a standard U.S. Bu-Ord size 33 synchro mount and gives an output in Gray Code. This device supplements the Ketay range of Gray Code encoders which includes a size 18 providing 256 counts and a size 23 providing 512 counts per turn.

### MINIATURE WIRE-WOUND CONTROL

A miniature wire-wound control that will dissipate 3 W can now be obtained from GENERAL CONTROLS, LTD., 13/15, Bowlers Croft, Basildon, Essex. The control is 0.916in in diameter by 0.660in deep, and it is fitted with a silicone glass laminated former, a brass "turned on" lid, and it can be supplied with turret lugs, solder tags, fly-away connections, or suitable for direct insertion into printed boards. The housing is moulded in mica loaded material X4933/4, and can be supplied as a fully sealed tropicalised unit, with a maximum resistance value of 50 k $\Omega$ .



# E.A.W. Conference

## BRANCH DELEGATES MEET IN LONDON

**V**ISCOUNTESS KILMUIR, president of the Electrical Association for Women, presided at the Association's 36th annual conference at the Kingsway Hall, London, on 2nd May. In welcoming the 600 delegates from all parts of the country, including Scotland and Wales, Lady Kilmuir spoke of the expansion of the E.A.W. at a time when many voluntary organisations were having difficulty in maintaining their membership. The Association's new campaign, "Electricity for Safety," had been launched; the number of electrical fatalities in the home during 1960 was only half that of the previous year. It was the E.A.W.'s firm belief that increased electrical education would result in a further reduction in such tragedies. A special welcome to the conference was given to three representatives from the German Housewives' Association, who were attending as guests following the visit of Miss Mary George (director, E.A.W.) to their conference in Hanover last year.

Presenting the annual report, Miss George said that in the branches there had been both expansion of numbers and activities. The 16 new branches formed in 1960 constituted the largest number in one year since the

Association itself was founded. Mention was also made of the formation of the New Zealand E.A.W. with branches in Wellington, Auckland, Christchurch and Dunedin. This was the direct result of Miss K. Pennett's visit in 1959 as holder of a Caroline Haslett Travelling Exhibition.

The total number of E.A.W. certificates in electrical housecraft awarded to demonstrators by the end of 1960 was 3,450 and the total awarded to teachers was 2,472. Seventeen demonstrators were awarded the E.A.W. Diploma, making a total of 570. The number of teachers who hold the Diploma is now 95. The demonstrator to gain the highest marks in the Diploma tests during the year is awarded the Elizabeth Sloan Chesser Cup and the 1960 winner was Mrs. R. M. Robinson. A new trophy to be awarded each year to the branch whose entrants gain the highest average marks in the Home Workers' Examination was jointly won by the Caerphilly and Nottingham branches.

The adoption of the annual report was proposed by Miss R. E. S. Cox (Eccles) and seconded by Mrs. J. S. Smith (Cardiff). The accounts were presented by Mrs. W. S. Carty and their adoption was proposed by Mrs.



At the Association's luncheon: 1. Mr. J. I. Bernard with two members of the German Housewives' Association, Frau Lotte Uekermann (left) and Frau Erika Luther. 2. Viscountess Kilmuir, president, E.A.W. (right) greets the Hon. Lady and Sir Leslie Gamage. 3. Brig. W. G. S. Thompson chatting to the Dowager Lady Swaythling. 4. Mr. Richard Wood, Minister of Power, with Mrs. Wood (left) and Miss Mary George (director, E.A.W.). 5. Left to right: Mr. E. B. Sawyer, Lord and Lady Citrine and Mr. W. N. C. Clinch



## ***WE SPECIALIZE IN UNIT VENTILATION...***

### **LONDON**

60, Rochester Row,  
London, S.W.1.  
Telephone: Victoria 2244

### **GLASGOW**

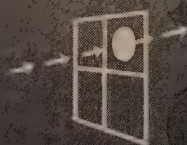
135, Bath Street  
Glasgow, C.2.  
Telephone: City 7167

### **MANCHESTER**

18, Lloyd Street,  
Manchester, 2  
Telephone: Blackfriars 0634

# ***Vent-Axia***

BRANCHES IN THE UNITED KINGDOM  
AGENCIES THROUGHOUT THE WORLD



### **BIRMINGHAM**

Lee Bank House, Holloway Head,  
Birmingham, 1.  
Telephone: Midland 4595

### **NEWCASTLE**

42, Jesmond Road,  
Newcastle-upon-Tyne, 2.  
Telephone: Newcastle 813391

### **LEEDS**

Britannia House, Wellington Street,  
Leeds, 1.  
Telephone: Leeds 22226

### **BRISTOL**

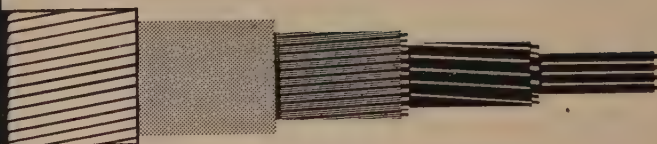
Brunel House, St. George's Road,  
Bristol, 1.  
Telephone: Bristol 27567

***... and invite you to make use of our free technical service***





# PERMANOID



## is 'laid' for permanence!

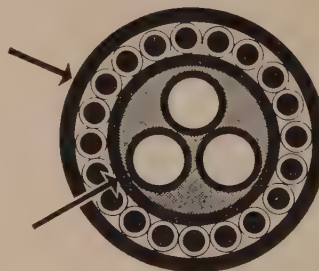
Thermoplastic Armoured Cable quality is directly related to the P.V.C. Compounds used and to the 'close packing' of the armouring wires during 'lay.' Strict standards of control and inspection ensure that PERMANOID Armoured Cables are 'laid' to provide permanent reliability in service.

Consider the advantages of PERMANOID Armoured Cable over traditional lead covered, paper insulated types. Lighter in weight, the cable can be installed by a smaller labour force; can be laid in an unprepared trench; requires no protecting tiles; ducting need only be used at road or service junctions; direct electrical labour can be used for series looping or compression gland jointing, wiped joints are only required for connections to H.V. Cable . . . and capital outlay IS REDUCED because PERMANOID COSTS LESS.

*Available for power or control installations.*

*A plastic compound evolved by PERMANOID chemists makes possible a cablesheath with excellent ageing properties and gives maximum protection against mechanical abrasion and attack from most forms of corrosion.*

*The inner cores of PERMANOID PVC Armoured cables are insulated with a PVC specially compounded to provide electrical characteristics in excess of British Standards.*



Full details of this and general wiring unarmoured cables from:—

# PERMANOID

LIMITED, New Islington, Manchester 4. COL 1371

### LONDON

17-21 Emerald St.,  
Chancery 6543/4.

### GLASGOW

18 Gibson St.,  
Western 2102.

### BRISTOL

9 Portland Sq.,  
Bristol 26894.

### NEWCASTLE

Manors,  
Newcastle 24959.

### WOLVERHAMPTON

17 Bond Street,  
Wolverhampton 24082.



**E.A.W. CONFERENCE** [*continued*]

N. S. Turner (Durham) and seconded by Mrs. M. W. Bennett (Gosport). Later a ballot was held to fill the six vacancies on the National Executive Committee and of the 19 candidates the following were elected:—Mrs. A. F. Allan, Mrs. S. Bird, Mrs. M. Broadhurst, Mrs. C. Cole, Mrs. W. S. Carty and Mrs. N. G. Wallace.

**Annual Luncheon**

The annual luncheon which followed the meeting was held at the Connaught Rooms and guests included leaders from all branches of the electrical industry. Lady Kilmuir was in the chair. The toast of the Association was proposed by Mr. Richard Wood, Minister of Power, who said that such a gathering was an important reminder that women were extensive users of electricity. Women, he said, must be convinced that electricity was worth while and shown how to make the best use of it; and suppliers must be made to understand the subtle adaptations which domestic use might demand. It was just those needs that the E.A.W. was designed to deal with. While hoping to convince his listeners that electricity was of benefit to mankind, he trusted that he had said nothing to

suggest that it was more to be desired than coal, gas or oil—or any of the industries with which he was at present connected. The Government's aim, he stressed, was to ensure that all such industries competed on equal terms to ensure that the country's growing demand for energy was supplied in the most economic way. The electrical industry, he said, was a great industry with a great future. Nuclear generation was just beginning and the rapid growth of demand for electricity was one of the few certainties that this world offered.

In thanking the Minister, Lady Kilmuir said that this was indeed a technical world and while many women in the professions and in industry helped to create the facts and figures of a technical society, it was equally important that the women in the home should understand them. By promoting the wider use and knowledge of electricity the E.A.W. was helping to reduce accidents in the home. Better lighting and better wiring systems with more socket-outlets would help much towards this end and she commended to everyone present the E.A.W.'s latest safety campaign.

Later the same afternoon delegates attended a special reception at English Electric House by invitation of the English Electric Co., Ltd.

## ENGINEERS AND LANDSCAPES

THE collaboration of civil engineering and landscape architecture was discussed yesterday (Thursday) at a joint meeting of the Institution of Civil Engineers and the Institute of Landscape Architects. Mr. G. A. Jellicoe, C.B.E., presented the landscape architect's point of view and in the course of his paper quoted two "nuclear" examples. The first was the case of the proposed Oldbury-on-Severn nuclear power station. For this an exact plan of the excavations (now proceeding) and a design "in principle" to give guidance to the architects of the consortia, who would be in competition, were drawn up. A report, prepared for the planning officer of the Gloucestershire County Council, described the design in detail and its relationship with the surrounding area. The report dealt, *inter alia*, with the treatment of such factors as fences and approach roads.

Mr. Jellicoe admitted that the problem of the outgoing transmission lines had not been solved. He hinted that it might be possible eventually to devise an economic underground system, but he also thought that overhead lines might conceivably be acceptable "a generation or so ahead."

The second example was the Atomic Energy Research Establishment at Harwell. This was underground and the problem was the disposal of the excavated earth. It was spread out and shaped to conform with the nature of the surrounding terrain and will be covered by trees and other natural growths.

The civil engineer's point of view was put by Mr. C. S. Chettoe who included in his paper some notes on power stations and substations and grid lines. He said that a system of collaboration in design, evolved by the Central Electricity Generating Board, appeared to work well. Engineers, architects and landscape architects were brought together at the beginning of a project, and standard terms

of reference provided for the landscape architect and the architect to work together. It was open to the landscape architect to suggest changes in the site design and layout to fit it in better with the surroundings, apart from designing the surroundings themselves in three dimensions.

Positions and outlook of the two stages of a nuclear power station might be varied—for example, from two blocks in line to two at right-angles; the cooling tower site pattern might be changed, and so on.

Dealing with overhead lines, Mr. Chettoe said that the degree to which they were objectionable depended on the terrain over which they passed. The standard towers were well designed and were not themselves objectionable. The colour of "pylons" was important and might well be varied according to background, avoiding aluminium or white.

**Belfast Power Station Completed**

TO mark the completion of the £15 million Belfast Power Station West, Lord Brookeborough, Prime Minister of Northern Ireland, last Friday unveiled a commemorative plaque in the entrance hall. The station has a capacity of 240 MW from five turbo-generators, three with a capacity of 60 MW each and two with a capacity of 30 MW each. The construction of this coal-fired power station was commenced in 1951 and the first 30 MW unit went into commission three years later.

During the opening ceremony the Prime Minister said: "There has been a staggering increase in the use of electricity in Northern Ireland since the war and it is plain that demand is far from its peak. The fact that Northern Ireland has ample power at a price comparing very favourably with that in the rest of the United Kingdom is very important in attracting new industry."



## Financial Section

# STOCKS and SHARES

BRITISH Insulated Callender's Cables are raising the best part of £15 million by a public issue of £10 million 6½ per cent debenture stock (for which the application lists closed yesterday, Thursday) and a "rights" offer of 2·7 new £1 ordinary shares to existing holders at a price of 40s. Initial transactions in these took place at a premium of about 18s. Proceeds of the operation will be applied to a large extent in replacing temporary borrowings which have been used to finance a rising volume of business. Assuming maintenance of the present 13½ per cent rate of dividend on the larger capital, the new shares at an all-in price of 58s offer a yield of nearly 4½ per cent, and they will be transferable free of stamp duty for some weeks to come.

### Outlook for B.I.C.C.

In his review accompanying the full report of B.I.C.C., Sir William McFadzean gives an encouraging account of the outlook. As known previously, sales of the group increased by about 12 per cent in 1960 and net profits, after tax, came out a little higher at £3·6 million. Prices for certain cables were still not remunerative, but more was earned through the group's other activities at home and abroad. Special efforts were made during the year towards the establishment of more economic prices for some products, and in improving manufacturing and selling arrangements. The chairman's comments indicate satisfaction with progress in both these directions.

### Babcock and Wilcox

There was not a great deal in Sir Kenneth Hague's statement accompanying the Babcock & Wilcox annual report to relieve the comparative heaviness of the market in shares concerned with power plant construction. Notice was taken nevertheless of his references to the fact that the disappointing extent of the improvement in last year's profits was due largely to the absorption of losses on the two nuclear power contracts. For the new Sizewell nuclear power station, the chairman adds, full account has been taken of those adverse experiences. This recalls the observation by Lord Chandos at the A.E.I. meeting to the effect that risks involved in tendering for new stations had become much

reduced, and that he expected a modest profit on the Dungeness project. Reviewing conditions generally for the manufacturers of heavy plant, the chairman of Babcock & Wilcox does not foresee an early return to a more reasonable profit level, although he

expects increasing advantages from the reshaping of the company's productive capacity.

### Irregular Markets

Babcock & Wilcox shares at 32s 9d showed a loss of 2s 3d over the week.

## Price Changes in

Company or Board	Nom. Value	Week's		Dividend		Yield %	1961		
		Middle price 8th May	Rise or Fall	Pre-vious	Last		High-est	Low-est	
Gilt-edged Stocks							£	s	d
Brit. Elec. 1968/73	100	75½		3	3	3 19 9	75½		73½
Brit. Elec. 1974/77	100	70½		3	3	4 5 0	70½		69½
Brit. Elec. 1976/79	100	72½		3½	3½	4 16 6	73½		71½
Brit. Elec. 1974/79	100	81½		4½	4½	5 4 3	82		80½
Brit. Elec. 1967/69	100	91		4½	4½	4 19 0	91½		89½
Overseas Electric Supply									
Calcutta Elec.	£1	22/-		7†	7½†	11 2 6	22/-		20/6
East African Power	£1	13/9		8	10	14 11 0	15/-		13/3
Nigerian Elec.	£1	16/6		8	10	12 2 6	19/9		15/6
Perak Hydro-Elec.	£1	20/-		10	10	10 0 0	20/-		17/6
Electrical Shares									
Aberdare Holdings	5/-	15/9		17½	17½	5 11 0	16/-		14/3
Aerialite	1/-	7/9	-3d	54	54	7 0 0	8/-		6/9
Allen, W. H.	£1	40/9		14	10*‡	4 18 3	40/9		36/-
Allied Insulators	5/-	10/-	+6d	20	10*	5 0 0	10/-		9/9
Alwyn Holdings	5/-	26/6		—	12½	2 7 3	27/-		24/6
Anglo-Portuguese Tel.	£1	18/9		9	9	9 12 0	25/-		18/9
Arcoelectric	1/-	6/-		15	15	2 10 0	6/-		3/9
Aron Meters	£1	70/-		15	15	4 5 9	70/-		67/6
Assoc. Elec. Ind. Ord.	£1	43/-	-6d	15	15	6 19 6	48/6		39/6
Automatic Tel. & El.	5/-	19/9	-9d	17	17	4 6 0	20/6		14/9
Babcock & Wilcox	£1	32/9	-2/3	9	9	5 10 0	36/6		30/3
Bakelite	10/-	57/6		17½	17½*	3 0 9	57/6		42/-
Baldwin, H. J.	2/-	1/3		10	Nil	—	1/6		1/6
Berry's Electric	5/-	50/9	+9d	30	30*‡	2 19 0	51/-		37/-
Bowthorpe Holdings	2/-	10/3	+9d	27	18½*	3 12 3	10/3		8/-
Brit. Elec. Resistance	2/-	8/3		17½	17½*‡	4 4 9	8/9		6/6
Brit. Elec. Traction:									
Def. Ord. "A"	5/-	56/-	+6d	35	40	3 11 6	56/-		41/9
Brit. Electronic Ind.	5/-	13/-	+3d	—	15½	5 15 6	15/3		12/3
B.I. Callender's	£1	57/-x.r.	-1/-	13½	13½	4 14 9	62/3		49/6
B.I. Callender's 6% Pref.	£1	17/9	+3d	6	6	6 15 3	18/3		17/6
British Thermostat	5/-	35/-	-6d	35	20*	2 17 3	40/-		28/-
Brook Motors	10/-	50/-		25	25*	5 0 0	50/-		47/-
Bulgin, A. F.	1/-	11/6	+1/-	55	40*	3 9 6	11/6		7/9
Bulpitts	5/-	23/-		15	16½	3 10 9	26/3		16/9
Burco Dean	5/-	9/-		18	14	7 15 6	10/-		8/9
Cable & Wireless	5/-	18/9	+6d	10	10*‡	2 13 3	19/3		12/6
Cambridge Instruments	5/-	38/6	+6d	12½†	22	2 17 3	38/6		30/-
Chloride El. Storage "A"	£1	84/6	+1/-	17½	20	4 14 9	91/-		72/-
Clarke Chapman	£1	50/6	-9d	13½	13½	5 9 0	54/-		43/6
Clarke, T.	2/-	7/9	+3d	16	16	4 2 6	8/-		5/3
Combined Elec. Mfrs.	4/-	9/9	-3d	—	12½‡	5 2 6	10/-		7/6
Contact Switchgear	5/-	15/-		14	14	4 13 3	16/-		14/6
Cossor, A. C.	5/-	6/3		5	Nil	—	8/-		6/6
Crabtree	10/-	29/6	-6d	20	12½*	4 4 9	33/9		26/3
Crompton Parkinson	5/-	13/6		14	12½*	4 12 6	14/-		11/3
Davis & Timmins	5/-	46/3	+3d	25	35*	3 15 9	46/3		30/3
De La Rue	10/-	67/6		22½	22½‡	3 6 9	67/6		55/-
Decca "A"	10/-	70/-	+1/-	20	23½	3 6 9	70/-		52/3
Desoutter	5/-	63/6		30	35	2 15 0	63/6		49/-
Dewhurst	2/-	12/-		20	20	3 6 9	12/-		7/6
Dictograph Tel.	2/-	12/9	+3d	20	20*	3 2 9	12/9		8/6
Dimplex	5/-	70/-	+4/9	—	30	1 15 9*	71/-		47/9
Dubilier Condenser	1/-	3/-		25	30	5 0 0*	3/-		2/3
Dupont	5/-	16/3		17½	20	4 2 0*	16/3		12/6
E.M.I.	10/-	46/6	-2/-	20	17½*	3 15 3	51/3		41/6
Eleco	2/-	9/-	+3d	20	20	2 4 6*	9/-		4/3
Electrical Apparatus	5/-	18/-		14½	20	5 11 0	18/-		17/-
Electrical Components	5/-	9/9	+3d	15	11½*	5 18 0	9/9		9/-
Elec. Construction	£1	33/9	-2/3	9	9	5 6 9	39/-		30/6
Elliott-Automation	5/-	37/-	+6d	9·3	13	1 15 3	37/6		25/6
Enfield Rolling Mills	£1	46/6	-1/6	15	15	6 9 0	51/6		45/6

The above quotations are based upon middle prices in the Stock Exchange Daily Official List.

\* After scrip issue.

† Free of income tax.

‡ Dividend indicated.



There were further falls also in C. A. Parsons, to 63s 9d, and A. Reyrolle, to 46s 6d, reflecting the cautious assessment of prospects by the chairman of C. A. Parsons. A.E.I. eased further to 43s, at which level the yield becomes nearly 7 per cent. Electric

Construction lost 2s 3d to 33s 9d. Generally the trend of industrial share prices became more irregular than of late and there was a tendency to take profits in cases where previous rises had been exceptionally favourable. I.C.T. shares, for instance, which had

moved up from 77s 6d to 107s in the space of about two months went back to 101s 3d.

### Higher Prices

Many good features continued, however, to appear in the industrial share lists. Dimplex and Berry's Electric, the twin stars of the electrical market last year, both showed signs of renewed strength after a relatively quiet spell. A. F. Bulgin came in for favourable comment and moved up to their best price of the year at 11s 6d. New high points were recorded also by Decca, Ever Ready, Pyrotenax, Walsall Conduits, Bowthorpe and Westinghouse Brake. Ultra Electric remained very active and gained 1s 3d to 23s 9d.

### Good Reports

At the annual meeting of Newman Industries the chairman told shareholders that business is being well maintained this year, and that in the normal course of events the results should be no less favourable than those of 1960. In that period a further expansion of 28 per cent in profits accommodated very comfortably a second successive increase in the dividend to 15 per cent, on the basis of which the 5s shares at 6s 3d yield just over 4½ per cent, covered more than three times over by earnings. Expectations of good figures from Simms Motor & Electronics were very well satisfied by the preliminary statement. Following a jump of more than 60 per cent in 1959, the group profit (before tax) expanded by nearly another 40 per cent last year. The dividend goes up again from the equivalent of about 13.6 to 17.1 per cent.

### New Issues

Dealings began this week in a new issue of 5s shares by Wolf Electric Tools. Offered to shareholders at 13s, they opened at a premium of 4s 6d, at which level the yield on the basis of the 13½ per cent dividend paid for 1960 (covered three times by earnings) works out at about 4 per cent. The new money will be used in paying for a newly acquired factory. In order to avoid interruptions to production, occupation of this will be spread over a period of more than two years, after which the benefits should become apparent. Meanwhile the level of trading is said to be well maintained. Sangamo Weston's new issue is in the form of a one-for-three scrip distribution. In the company's annual report shareholders were advised that this year's profits might not equal the record figure of 1960, but that the directors hoped to be able to recommend on the increased capital a dividend of not less than 10 per cent.

## Electrical Investments

Company or Board	Nom. Value	Week's		Dividend		Yield %	1961		
		Middle price 8th May	Rise or Fall	Pre- vious	Last		High- est	Low- est	
Electrical Shares—continued							£	s	d
English Electric ...	£1	35/6	—9d	10	10	5 12 9	40/9	32/-	
English Electric 3½% Pref. ...	£1	11/-		3½	3½	6 16 6	11/9	11/-	
Ericsson Tel. ...	5/-	31/6		13½	13½	3 9 0	32/-	23/3	
Ever Ready ...	5/-	38/-	+1/-	27½	20*	2 12 9	38/-	31/6	
Falk Stadelmann ...	£1	25/9	—3d	10	7½	5 16 6	26/-	21/9	
G.E.C. ...	£1	36/3	+3d	10	10	5 10 3	40/-	29/3	
G.E.C. 6½% Pref. ...	£1	19/-		6½	6½	6 16 9	19/3	18/3	
General Cables ...	5/-	5/6		15	Nil	—	6/3	3/9	
Goblin (B.V.C.) ...	5/-	7/6		12½	10	6 13 3	8/6	6/-	
Hackbridge Holdings ...	5/-	5/9		20	20	8 14 0*	6/9	5/-	
Harland Engineering ...	5/-	15/-	—3d	16	16	5 6 9	19/-	15/-	
Head Wrightson ...	5/-	29/3	+3d	20	14*	2 8 0	30/-	22/-	
Heatrae ...	2/-	19/-		22½	25	2 12 9	19/-	12/6	
Holophone ...	5/-	20/6	+6d	26	30	7 6 3	20/6	17/3	
Hoover ...	5/-	55/6		90	45*	4 1 0	55/6	46/-	
Hunt, A. H. ...	4/-	24/3		20	20	3 6 0	25/9	18/-	
Intl. Combustion ...	5/-	33/-	—9d	30	30	4 11 0	33/9	24/-	
Intl. Computers & T. ...	£1	101/3	—5/6	10	11½	2 4 6	107/-	59/-	
Johnson & Phillips ...	£1	21/3	+1/3	5	Nil	—	22/9	17/6	
Kenwood Mfg. ...	1/-	5/-		—	—	—	6/-	5/-	
Laurence Scott ...	5/-	17/3		15	15	4 7 0	18/9	15/3	
Lister, R. A. ...	£1	56/-		14	14	5 0 0	56/-	47/3	
Lucas, J. ...	£1	69/3	—2/-	12½	13½	3 19 6	71/6	62/-	
Marryat & Scott ...	2/-	17/6		22½	27½	3 2 9	17/6	13/9	
Mather & Platt ...	£1	44/6		11	11	4 18 9	51/6	41/6	
Metal Industries ...	£1	65/3		14	15	4 12 0	65/3	53/-	
Midland Elec. Mfg. ...	£1	66/3		12	12	3 12 6	66/3	58/6	
Murex ...	£1	50/-	+2/6	15	20	4 11 3	50/-	39/3	
Newman Ind. ...	2/-	6/3		12½	15	4 16 0	6/3	5/-	
Oldham & Son ...	1/-	3/-		17½	17½**	5 10 0	3/-	2/3	
Parsons, C. A. ...	£1	63/9	—1/3	9½	12½	3 18 6	72/6	46/9	
Philips' Lamps ...	Fl.10	252/6		16	16*	1 5 6	£13½	£10½	
Plessey ...	10/-	60/-		15½	17½	2 16 6	60/-	46/6	
Pullin Group ...	2/-	15/-		25	25	3 6 9	15/-	11/3	
Pyrotenax ...	5/-	63/-	+1/-	34	40	3 3 6	63/-	46/6	
Radiation ...	£1	32/3	+3d	12	10	6 4 0	37/6	31/6	
Reliance-Clifton ...	5/-	29/6	+6d	15	15	2 10 9	29/6	22/6	
Reyrolle ...	£1	46/6	—2/-	17½	9½*	4 4 0	51/6	36/6	
Richardsons Westgarth ...	10/-	7/6	—9d	8½	8½	—	8/3	6/6	
Sangamo Weston ...	10/-	23/9x.c.		12½	13½	4 4 3*	25/9	19/9	
Scott, James ...	5/-	27/-		24	25*	4 12 6	27/9	25/6	
Simon Engineering ...	5/-	43/-	—9d	—	27½	3 4 0	43/9	28/-	
Smith (England), S. ...	4/-	22/6	—1/-	17½	20	3 11 0	23/9	17/-	
Southern Areas ...	£1	19/-		5	6	6 6 3	21/-	14/6	
Strand Elec. ...	5/-	18/3		14.6	20½	5 9 6	20/-	12/3	
Sturtevant ...	5/-	14/6	—1/-	15½	13½	7 6 0	18/6	13/9	
Sun Elec. ...	5/-	17/3		15	18½	5 7 3	17/6	17/-	
T.C.C. ...	10/-	41/-		35	22½*	5 9 9	41/-	40/-	
Telephone Rentals ...	5/-	32/6	+3d	15	15	2 6 3	32/6	21/9	
Thompson (John) ...	5/-	17/-	+9d	25	20	—	16/9	14/-	
Thorn Elec. ...	5/-	58/9	—9d	20	25	2 2 6	63/-	44/6	
Thornycroft ...	£1	31/3	+1/6	6	6	—	34/9	25/9	
Tube Investments ...	£1	81/3	+6d	—	14	3 9 0	85/-	72/6	
Ultra Electric ...	5/-	23/9	+1/3	20	25	5 5 3	25/-	12/6	
Walsall Conduits ...	4/-	15/-	+6d	22½	15*	4 0 0	15/-	10/9	
Ward & Goldstone ...	5/-	35/6	—6d	30	35	2 9 3*	36/6	25/6	
Watford ...	2/-	9/-	—3d	25	20*	4 9 0	10/9	8/6	
Westinghouse ...	£1	43/9	+2/-	11	11	5 0 6	43/9	36/-	
West, Allen ...	5/-	13/6	—3d	12½	13½	5 0 0	14/6	11/6	
Wilkins & Mitchell ...	5/-	13/6	—6d	17	21*	—	15/3	11/9	
Wolf Electric ...	5/-	17/3x.r.	+9d	12½	13½	3 19 9	17/6	14/-	



## REPORTS and DIVIDENDS

**B.I.C.C.'s Encouraging Results.**—Sir William McFadzean, chairman, tells shareholders in his annual statement that the results of British Insulated Callender's Cables, Ltd., to date for 1961 are encouraging and provided there is no major dislocation in trade generally, he looks forward to the group having a successful year.

The group's business, he says, is so widespread that the intake of orders depends on the general level of industrial activity, and only something in the nature of a general recession at home or some major interruption of trade abroad would seriously affect the group's prosperity as a whole. He believes the steps taken to expand and improve the efficiency of the group's manufacturing and selling arrangements will enable it fully to retain its share of the business available, and it is hoped that by the price leadership the company has endeavoured to give in the cable industry at home, it will be able to secure a reasonable return on all its principal products. Although the future of world trade can never be free from political uncertainty, there are, Sir William believes, encouraging signs of a trend towards freer and increasing trade between the nations.

The two principal aims in 1960 were to obtain more economic prices for certain products, and to achieve the highest overall efficiency in cable-making activities as a whole by unifying and concentrating the group's production and selling arrangements for a number of the main products. The wisdom of this policy has been proved by the substantial increase in volume achieved. Unfortunately, the price at which much of this business could be obtained was disappointingly low.

In general prices for rubber and thermoplastic insulated cables did not become even marginally profitable until the last quarter of the year. Prices for low-voltage power cables were unprofitable throughout the whole year and, partly because of the traditional pattern of term contracts with many customers, have only recently been brought to a level which will show a small profit to an efficient producer.

It was not to be expected that the group's decisions on prices would be universally followed, nor indeed have they been, but sufficient stability would appear to have been restored to the industry to enable a properly run business to obtain a reasonable, though still small, reward for its efforts. The benefits should be progressively felt during 1961. In the power cables

field at home the parent company factory at Erith and the group factories of W. T. Glover & Co., Ltd., and Scottish Cables, Ltd., have been well loaded during the year. The demand for thermoplastic insulated low-voltage cables has substantially increased, and there has been a growing demand for polythene insulated power cables. The demand for mineral insulated cables continues at a high level. One of the main points of interest is the increasing emphasis on high temperature cables at home and overseas. Last year was primarily a period of further development in the highly technical field of submarine power cables and pipelines, a characteristic feature of which is its somewhat uneven flow of orders.

Although the volume of orders received for accessories during the year was substantially up on 1959, profit margins were lower, partly due to uncertainties about the railway electrification programme in this country which made future planning difficult. There was a further increase in the activities of the Construction Company. As one example, the quantity of high-voltage cable installed exceeded the 1959 figure by over 50 per cent.

Direct exports from the U.K. and sales by subsidiaries overseas amounted to £45 million compared with £38 million in 1959.

Overseas factories have continued to make progress in line with the growing local demands. Business conditions in some countries, particularly Canada, were not easy but, overall, these investments have made a further contribution to 1960 results, and Sir William is confident they will be of increasing benefit to the group in the years ahead.

The group's main problem in contemplating future overseas trade, Sir William says, is not so much political disturbance in one part of the world or another, but that of ensuring that British prices are competitive in world markets. Here any British manufacturer must feel some anxiety in face of the continuing increases in costs outside his control, such as essential services and the continuing inflation in labour costs. There is a limit to what can be achieved by mechanisation and new techniques and a vital part to be played by a national co-operative effort of all interests concerned. Everyone in this country, Sir William suggests, must recognise that they are directly or indirectly concerned with the achievement of success in the vital export field and must play their full part.

This week the company offered, at

£99 per cent, £10 million 6½ per cent debenture stock 1981/86. There are also being issued 2,692,378 ordinary £1 shares at 40s to holders registered on 7th April on a one-for-seven basis.

B.I.C.C. are also making offers to acquire the balance of the share capital of Thomas Bolton & Sons, Ltd.

**Babcock's Nuclear Losses.**—In his review circulated with the accounts, Sir Kenneth Hague, chairman, Babcock & Wilcox, Ltd., says that during the year the company sustained losses of £650,000 on the Hinkley Point and Trawsfynydd nuclear power station contracts. A provision of £700,000 has also been made out of existing contingencies reserve for further losses which may be incurred on these nuclear contracts before they are completed.

At its works the company has virtually completed all components for the Hinkley Point and Trawsfynydd nuclear power stations and has to find employment for the specialised plant until such time as the new contract for the Sizewell nuclear power station reaches the shop floor towards the end of this year. For the Sizewell contract, full account has been taken of the adverse experience at Hinkley Point and Trawsfynydd, both in respect of shop manufacture and erection. The company continues to take an active interest in marine nuclear studies and recently submitted a design to the Minister of Transport for a nuclear ship propulsion unit. It is also currently engaged in design and construction of components for the propulsion system of the Navy's second nuclear submarine. Study contracts are being undertaken on a commercial basis for nationalised bodies and other important organisations.

The value of contracts on hand at 31st December, 1960, was slightly higher than at the end of the previous year. In spite of the increased costs of labour, raw materials and all services, the price level of boiler plant is much less than it was ten years ago. This has been achieved through improvements in boiler design and in the overall costs of installation which together afford a substantial reduction in capital cost to customers. These new designs have also made a notable contribution to higher operating efficiency in power stations. However, the profit margins are generally insufficient in the light of the considerable technical risks involved in design, manufacture and erection and in the fulfilment of contract guarantees demanded.

The consequences of certain unfavourable features in the general



trading conditions within the heavy plant industry are still strongly influencing future prospects, Sir Kenneth says. It is not easy for the major buyer of heavy plant always to pursue a settled long-term policy of ordering new power installations. Because of this he hopes there will be more recognition that price levels must be adequate to enable manufacturers to maintain their capital plant at the high standards that have existed in the past and to permit them to allocate sufficient funds to carry out a reasonable programme of research and development associated with their products.

Sir Kenneth is unable to forecast an early return to a more reasonable profit level but, on the other hand, he is satisfied that the steps which have been taken for re-shaping the productive capacity of the company to meet the present-day demands will prove increasingly advantageous.

**Radiation, Ltd.**—Referring to the activities of the Electrical Division in his annual review Mr. W. Donald King, chairman, says that during the year an increased volume of Jackson cookers was delivered enabling the company to regain its share of the market which it had not achieved in recent years. It is expected that during 1961 this volume and share will be maintained. Demand for the Parnall "Spinwasher" which was introduced in July continued to exceed production throughout the remainder of 1960. The demand for the company's tumble dryers during the season was less satisfactory but it maintained its share of the market. In view of the price at which small refrigerators are now available, under £30, the company anticipates that the 1961 season will show an improvement over 1960 but that the total which will be sold by manufacturers may be detrimentally affected by the existing retail stocks. Lamp sales and output continued to increase.

**Brook Motors, Ltd.**—Announcing an unchanged 5 per cent interim dividend for the year ending 30th September, 1961, the directors report a sharp expansion in the first half-year's group profits to £577,497, from £366,222 in the same period a year ago. The net balance is £212,717, against £155,829, after depreciation of £69,922 (£61,805) and tax of £294,858 (£148,588).

**Heatrac, Ltd.**, is raising the dividend on its £50,000 ordinary shares by 2½ per cent to 25 per cent for the year to 28th February, 1961, and intends to make a rights issue shortly. Increasing demand for the company's products, it is stated, makes it

necessary to provide additional manufacturing facilities and, coupled with other opportunities for expansion, necessitates the raising of further finance. After deducting tax £36,750 (£22,500) and depreciation £10,650 (£3,888), the net profit was up from £24,759 to £34,820.

**Bruce Peebles & Co., Ltd.**—In his statement to shareholders, Mr. T. Coughtrie, chairman, says it is the intention of the directors of both companies that the merger between Bruce Peebles and the Belmos Co., Ltd., should proceed.

Commenting on the loss in 1960, Mr. Coughtrie says that in 1959 it was decided that a substantial reorganisation of the works was necessary in order to meet the demands of the company's customers in future years and to increase the range of products and the size of some of the larger units. Capital expenditure of £300,000 in 1960, with the further commitments shown in the accounts, was necessary to enable the company to retain its place in the industry and keep pace with technical advance in all the activities with which it is concerned. Benefits from this expansion programme are already evident and the research laboratories, which are now virtually complete, are making their contribution. Works reorganisation is now almost complete; production, which inevitably suffered from structural and plant changes, began to improve towards the end of 1960 and has since further improved.

The order book at the end of 1960 stood at a record level, partly due to a low output in that year. A high output budget has been set for 1961 and new business is being received in sufficient volume to encourage confidence.

**Sturtevant Engineering, Ltd.**, is cutting its final dividend by 2 per cent to 10 per cent, to make 13 per cent tax free for 1960, against the 15 per cent paid for each of the five previous years.

Group net profits contracted from £148,438 to £113,118, after all charges, including tax of £144,130 (£125,402). The directors state that the profit of the companies in England showed an increase of more than 10 per cent over 1959, but this was more than offset by losses incurred by the Australian companies. Vigorous action has been and is being taken to rectify that position.

**Simms Motor & Electronics Corporation, Ltd.**, announces a final dividend of 12½ per cent on a capital increased by a one-for-ten scrip issue, making the equivalent of a fraction

over 17 per cent for 1960. The interim was on capital increased by a one-for-five rights issue. Taking the scrip issue only into account, the 1959 dividend equivalent was 13.6 per cent.

Group profits advanced from £1,037,690 to £1,408,147 and the net balance of £702,647 compares with £489,490.

**Henry Wigfall & Son, Ltd.**, of Sheffield, have now acquired a controlling interest in the firm of Dobsons (Sheffield), Ltd. This company, like Wigfalls, carries on the business of multiple shop retailers of radio and television sets, washing machines, refrigerators and all manner of household electrical goods and appliances, the bulk of which is on hire purchase or rental terms.

The directors of Wigfall consider that the amount of the purchase price is not significant having regard to the size of the issued capital of their own company.

**Wolf Electric Tools' Issue.**—Terms for the new capital issue by Wolf Electric Tools (Holdings), Ltd., to raise £206,000 were announced by Mr. G. M. Wolfe, the chairman, last week. The company is offering 318,395 5s ordinary shares at 13s each on a one-for-eight basis to ordinary shareholders.

**Holophane, Ltd.**—To reduce the previous disparity between interim and final dividends the directors have declared an interim dividend of 10 per cent (6 per cent) but they stress that this does not imply that the total distribution for the year ending 30th June, 1961, will be higher.

**Radio & Allied Holdings Ltd.**—Second interim dividend of 22½ per cent in accordance with merger terms.

## Bankruptcies

**S. Ross**, formerly carrying on business on his own account under the name of Jif Electrical Appliances and in partnership with another under the name of Newington Electrics at 98, Matthias Road, London, N.16, as an electrical dealer.—First and final dividend of 1s 6d in the £ payable 23rd May at Bankruptcy Buildings, Carey Street, London, W.C.2.

**Mary Hilda Gibson**, trading as Housewives Electrical Aids, 17, Vincent Road, Woolwich, London, S.E.18, electrical dealer.—Receiving order dated 13th February, 1961, rescinded. Grounds of revocation: Order ought not to have been made.

## Liquidations

**A. Bastin & Co. (Electrical), Ltd.**, 77, Barking Road, East Ham, E.6, electrical engineers.—First and final dividend of 10s 4½d in the £ payable at Inveresk House, 346, Strand, London, W.C.2.

**Beacon Supply Stores, Ltd.**, dealers in electrical goods, 13, Victoria Street, Nottingham.—Liquidator, Mr. R. C. Turton, 91, Talbot Street, Nottingham, appointed by creditors on 17th April.



# PARLIAMENTARY REPORT

## Those "Pylon" Advertisements

The Central Electricity Generating Board spent about £320,000 on public relations and publicity in the year ended 31st March last, Lord Hastings, for the Government, told the House of Lords last week. He was answering Lord Lucas of Chilworth who wanted to know the cost of "goodwill advertising" by the Board which, he said, seemed to have as its purpose the persuasion of the public to tolerate the placing of "pylons" in beautiful valleys. Lord Lucas also asked if the Board could be instructed to cease the expenditure forthwith.

Lord Hastings explained that the purpose of the advertisements was to tell the public of the problem facing the Board in extending the main transmission system to meet the increasing demand for power, taking into account its amenity obligations. Subject to the Board exercising reasonable restraint in its advertising expenditure, it was for the Board to decide what was justified in the circumstances.

The Minister of Power was satisfied that the Board was exercising reasonable restraint and he would not feel justified in asking it to provide information about the cost of particular parts of those activities.

Lord Lucas, amid laughter, said that the particular advertisement he was referring to depicted a hand holding a pylon with the caption "Where would you put it." He went on: "There may be varied answers to that question but the Minister of Housing and Local Government gave the Generating Board the answer about two weeks ago when he said, 'I shall put it underground.'" He thought that instead of wasteful expenditure the money would be better allocated towards reducing the cost of electricity to the taxpayer.

Lord Hastings said that the last way of reducing the cost of the supply would be to put all the transmission lines underground.

## Durham Power Stations

The siting of power stations in Co. Durham was discussed during question time in the House of Commons when Mr. Pentland asked the Minister of Power for a statement on the matter.

Mr. Richard Wood said that the choice of sites for new power stations was a matter for the C.E.G.B. The Board was building a station at Blyth which would be completed in 1965

and had no immediate plans for another new station in Co. Durham or Northumberland.

Mr. Pentland said that the report by the Northern Regional Board for Industry that Co. Durham was geographically unsuited for the siting of power stations had caused widespread dismay. He asked the Minister to have another look at the position.

Mr. Wood said he would like to make it clear that the advice from the Ministry had never suggested there were no suitable sites for power stations in the county but merely said that the problem of building power stations was not so easy as it looked. It had not recommended that no power station should be built there.

Mr. Pentland asked for categorical assurance that the C.E.G.B. would at least consider siting a station on the Durham coalfield. Mr. Wood said that the Board would no doubt take notice of what had been said.

## Langley Nuclear Research Station

The Parliamentary Secretary for Science, Mr. Freeth, said the Minister for Science would not authorise the Atomic Energy Authority to negotiate to take over the Hawker Siddeley Nuclear Research Station at Langley, Bucks., which was to close down. The Atomic Energy Authority had advised the Minister that it did not need the establishment. Answering Mr. Brockway, who said that Langley was one of the best staffed and best equipped research stations for its purpose in the country, Mr. Freeth said he did not think the Authority could be expected to take over work which it did not regard as being economically justifiable and work which it was already doing in a number of fields.

Mr. Peart asked who was to do research work in the production of small reactors like "Jason."

Mr. Freeth said the Authority was studying the organic moderated reactor and was keeping in touch with developments abroad. He understood that another British firm was studying the organic moderated reactor.

## Communication Satellites

The Assistant Postmaster General, Miss Pike, said the Post Office was co-operating with other bodies in a wide-ranging programme of communications satellite research. In a written answer to Mr. Peart, she said this covered orbits, altitudes and frequencies and the design of the elec-

tronic equipment in the communication satellites themselves. The first requirement was a ground station for joint experiments with the Americans in satellite communications across the Atlantic.

## Effect of Oil Tax

The Minister of Power, Mr. Wood, said he could not give an estimate of the cost to the electrical generating industry of the increase in duty on hydrocarbon oils during 1961-62. This would depend on the amount of oil used, which in turn would be affected by the price at which the C.E.G.B. was able to obtain its supplies.

## Photomultiplier Tube Symposium

A symposium on photomultiplier tube applications will be held at E.M.I. House, Manchester Square, London, W.1, from 13th to 15th September next. The aim of the symposium is to exchange information on the application of photomultiplier tubes in a wide variety of scientific and industrial fields, and to encourage discussion on the ways in which improvements can be made and new fields opened. Speakers will include experts in various fields of p.m. tube application, such as nuclear energy, spectroscopy and television. Attendance will be limited but requests are invited for application forms to E.M.I. Electronics, Ltd., Valve Division, Hayes, Middlesex. A nominal fee will be charged, to include a copy of the proceedings which will be sent to registrants shortly after the symposium.

## Arc Furnace Control

A control system for arc furnaces has been developed and patented by the British Iron and Steel Research Association. The automatic power input controller selects the correct voltage tap appropriate to the state of the process, as determined by time or signalled by a thermal probe, and carries out all the functions necessary in making automatic tap-changes with off-load or on-load tap-change gear. The Major Equipment Co., Ltd., Gorst Road, London, N.W.10, is building the controller under licence from B.I.S.R.A., and the first commercial version was shown at the recent Electrical Engineers Exhibition.



Now  
make  
joints  
**SAFER**  
IN  
**HALF**  
THE  
TIME  
with **NEW**

# 'SCOTCHLOK' CONNECTORS

## AND 'SCOTCH' BRAND ELECTRICAL TAPE No. 33

Use 'Scotchloks' on all types of electrical joints—the world's surest-gripping wire connector, and the fastest to apply! Fires caused through "tired" connections every year are still too numerous despite close observance of fire regulations. The remedy can cost no more than 2d. a 'Scotchlok' connection.

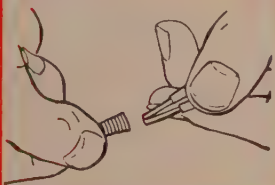
Though small in size the 'Scotchlok' exerts a pressure-grip which can be measured in tons. Even vibration

can't loosen its vice-like grasp—when it holds, it **HOLDS**. The secret is 'live spring action'. The moment a 'Scotchlok' is twisted on the wires, the spring cleverly opens and entwines, becomes part of the wires. The need for soldering is completely eliminated.

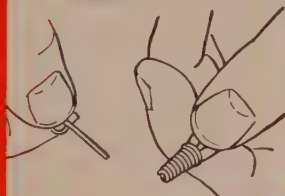
Every electrical joint is a potential danger point so *safeguard with 'Scotchloks' and be sure!* 'Scotchloks' are available in four *uninsulated* and three *preinsulated* sizes.

### HOW TO MAKE A 'SCOTCHLOK' JOINT

**1** Twist a 'Scotchlok' over the wires until tight.



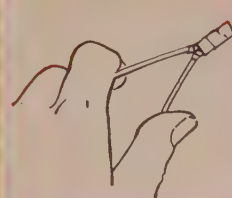
**2** Snap off winding stem to leave clean, compact connection.



**3** Insulate with Electrical Tape No. 33.\*



**4** Finished joint.



\*'Scotch' Brand Electrical Tape No. 33 will effectively insulate any electrical joint with 'wrap-around' security of up to 9500 volts per layer. It will not harden, become brittle or lose its grip under the most extreme conditions—torture tests prove it.

ORDER THESE PRODUCTS FROM  
YOUR ELECTRICAL WHOLESALER

Products of **3M** Company Research

MINNESOTA MINING AND MANUFACTURING COMPANY LTD., 3M HOUSE, WIGMORE STREET, LONDON, W.1



**TO  
ELECTRICAL  
ENGINEERS  
LOOKING  
FOR THE  
FINEST  
ELECTRICAL  
INSULATION**

PLEASE WRITE FOR DETAILS OF—

- \* Mica
- \* Micanite (Built-up Mica)
- \* "Paxolin" (Synthetic Resin Bonded Laminates)
- \* "Samica" mica paper insulation
- \* Glass Insulation
- \* Copper-faced "Paxolin"
- \* High Voltage Bushings
- \* Varnished or Impregnated Fabrics
- \* Vulcanised Fibre
- \* Leatheroid
- \* PVC Polythene and other Thermoplastics

*"Paxolin" & "Samica" are regd. trade marks.*

*Agents in most territories throughout the World*



**the electrical insulation people**



**THE MICANITE & INSULATORS CO., LTD.,**

**EMPIRE WORKS, WALTHAMSTOW, LONDON, E17.**

TEL: LARKSWOOD 5500. GRAMS: MYTILITE LONDON TELEX. TELEX 25183.





The fisheries research vessel "Clione"

## FISHERIES RESEARCH VESSEL

A NEW trawler type 154ft-long vessel, the *Clione*, has recently been completed by Cochrane & Sons, Ltd., Selby, to the order of the Ministry of Agriculture, Fisheries and Food for the special services of the Ministry's Fisheries Laboratories at Lowestoft. A large proportion of the main deck inside the casing has been devoted to laboratories. Instead of the normal fishroom there is a 35-ton tank intended to carry up to 20 tons of live fish for transplantation experiments.

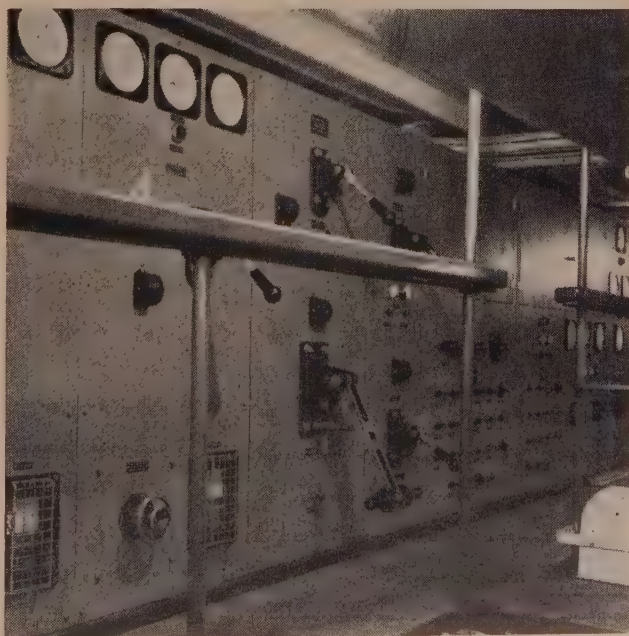
The main trawl winch has two drums, each capable of holding 1,200 fathoms of 2 $\frac{3}{4}$ in circular wire rope. This is driven by a 260 b.h.p., 650 r.p.m. motor, supplied from a 212 kW generator operating on the Ward Leonard system. This generator can also operate at constant voltage to supply power for general ship's use and the motor-alternator supplying the Pleuger rudder. The prime mover for this generator is a six-cylinder, 340 b.h.p. Ruston & Hornsby diesel engine.

The main d.c. power is generated by two Ruston Paxman 153 b.h.p., 1,200 r.p.m. engines, each driving a 102 kW, 240 V d.c. generator. There are two motor-alternator sets for a.c. supplies. One is of 31.25 kVA and is used solely for the laboratories, the second is rated at 120 kVA and serves to supply power for the Pleuger rudder. This incorporates a 100 h.p., 960 r.p.m. water-filled and lubricated squirrel-cage motor in the rudder blade, driving a propeller. A ship speed up to five knots can be obtained, and a steering thrust up to 40° either side. The power for this set is taken from the 212 kW winch generator on top of which is a boost generator for speed control, driven by vee belts from an extension of the armature shaft. By this means the speed of the Pleuger rudder motor can be reduced to approximately 30 per cent full speed. Additional auxiliary power is provided by a Ruston & Hornsby air-cooled engine driving a 20 kW d.c. generator. The generators and motors were supplied by Laurence, Scott & Electromotors, Ltd.

The electrical installation was carried out by Wm. Broady & Son, Ltd., who also manufactured the main switchboard. This is of the "dead front" pattern, 21ft in length, and controls the four 240 V d.c. generators (one 20, two 102 and one 212 kW) which are arranged to operate in parallel. The control of the 31 kVA, 240 V

single-phase alternator fitted for the supply to the laboratories and navigation equipment electronics is also arranged on the switchboard, as is the 415 V three-phase and neutral 50 c/s shore supply.

The supply cables and sub-circuit wiring for the electronic equipment are in screened cable to minimise interference. A circuit-breaker of 1,300 A capacity is fitted to accommodate the supply to a circuit which may be required for "electric fishing." All outgoing circuits are also arranged from this switchboard. Certain power units which can operate only on d.c. supply, and are required when the vessel is in harbour, are arranged so that they can be fed from the ship's generators while the vessel is at sea, or from a 20 kW three-phase transformer-rectifier unit when in harbour. Heating is electric throughout by individually controlled convector heaters, and additional heating has been incorporated in the ventilation system to control condensation when the ship is in port and not fully manned.



Electrical supplies are controlled from this switchboard



## NEW PATENTS

## Electrical Specifications Recently Published

*The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (3s 6d each including postage) are obtainable from the Patent Office, 25, Southampton Buildings, London, W.C.2*

## 1956

13614. Compagnie Générale de Télégraphie sans Fil.—Transmitter-receiver switches. 2nd May, 1956. (867660.)

15391. A. Reyrolle & Co., Ltd.—Electric relay devices. 15th August, 1957. (866427.)

17712. Lilwall, R. G.—Electric wire fences. 5th September, 1957. (867497.)

18903. Electric & Musical Industries, Ltd.—Quadratic interpolating devices. 11th June, 1957. Addition to 796994. (866319.)

25444. General Electric Co., Ltd.—Electrical apparatus for providing a measure of the standing wave ratio in an electromagnetic wave transmission means. 8th November, 1957. (866320.)

25526. Electric & Musical Industries, Ltd.—Networks for distributing electrical signals. 21st August, 1957. (867499.)

28314. Adamson, C., and Dineley, J. L.—Protection of electrical power circuits. 13th September, 1957. Cognate specification 14138. 3rd May, 1957. (866568.)

32386. English Electric Co., Ltd.—Electromagnetic protective relays. 23rd October, 1957. Addition to 841866. (866531.)

32810. General Electric Co., Ltd.—Electromagnetic waveguide terminating devices. 8th November, 1957. (866321.)

35121. Associated Electrical Industries, Ltd.—Brake control systems. 23rd October, 1957. (867506.)

35581. Plessey Co., Ltd.—Manufacture of moulded resistor tracks. 21st November, 1957. (866428.)

36563. Associated Electrical Industries, Ltd.—Electrical insulation of dynamo-electric machine conductor bars. 21st November, 1957. (866595.)

36930. Associated Electrical Industries, Ltd.—Operating circuits for low-pressure electric discharge lamps. 22nd October, 1957. (867864.)

36984. Electric & Musical Industries, Ltd.—Apparatus for visually representing binary coded numbers. 4th December, 1957. (866475.)

37194. Associated Electrical Industries, Ltd.—Automatic electric control of feeder means. 13th November, 1957. (867865.)

37798. Rist's Wires & Cables, Ltd., and Silver, R. J.—Termination of insulated electric conductors. 27th January, 1958. (867661.)

## 1957

477. Postmaster General.—Magnetic cores. 19th December, 1957. (866429.)

3007. Central Electricity Generating Board, and Smith, E. J. D.—Glaze compositions. 28th January, 1958. (867781.)

3453. Associated Electrical Industries, Ltd.—Cathode-ray oscilloscopes. 13th January, 1958. (866478.)

3777. Associated Electrical Industries, Ltd.—Dynamo-electric generators. 3rd February, 1958. (866746.)

6588. Associated Electrical Industries, Ltd.—Electric circuit interruptors. 21st February, 1958. (866507.)

8276. Bush & Rank Cintel, Ltd.—Electrical locks. 13th March, 1958. (867663.)

8364. United Kingdom Atomic Energy Authority.—Nuclear reactors. 26th February, 1958. (867969.)

14571. Yardney International Corporation.—Electrodes for electric cells or batteries. 7th May, 1957. (866493.)

15221. Chromatic Television Laboratories, Inc.—Self-decoding colour television apparatus. 14th May, 1957. (866569.)

16163. Texas Instruments, Inc.—Electrical switches. 21st May, 1957. (866597.)

17784. Radio Corporation of America.—Semiconductor devices. 4th June, 1957. (867413.)

19118. Telefunken G.m.b.H.—Amplifier circuits. 18th June, 1957. (867841.)

21319. Elektrolux A.B.—Washing machines. 5th July, 1957. (867415.)

23778. Postmaster General.—Magnetic strip material. 21st July, 1958. (866431.)

25727 and 25782. Telefunken G.m.b.H.—Transformers. 15th August, 1957. (867605/6.)

27022. Robertshaw-Fulton Controls Co.—Temperature sensitive electric control device. 27th August, 1957. (867873.)

27735. Panerai, G., and Panerai, M.—Devices for controlling from outside a mechanical or electrical member contained in a pressure-tight container. 3rd September, 1957. (866535.)

27923. Communications Patents, Ltd.—Television apparatus. 4th September, 1957. (866494.)

29063. International Computers & Tabulators, Ltd.—Circuits employing transistors. 29th August, 1958. (867526.)

31918. American Machine & Foundry Co.—Electric inductors and transformers. 11th October, 1957. (866546.)

32617. A.E.I.-John Thompson Nuclear Energy Co., Ltd.—Flux scanning equipment for nuclear reactors. 8th October, 1958. (866514.)

32863. Fairey Co., Ltd.—Frequency dividing circuits. 14th October, 1958. (867767.)

35041. Specialties Development Corporation.—Electrical network automatically responsive to a change in condition. 11th November, 1957. (866480.)

36144. Tesla, Narodni Podnik.—Thermionic tube with variable slope. 20th November, 1957. (867425.)

38058. Associated Electrical Industries, Ltd.—Electric circuit arrangements. 13th November, 1958. (867847.)

38065. Siemens & Halske A.G.—Space-charge wave tubes. 6th December, 1957. (867699.)

38215. Compagnie Industrielle des Téléphones.—Magnetic amplifier devices. 9th December, 1957. (867700.)

38908. Oldham & Son, Ltd., and Morton, H.—Accumulators. 14th November, 1958. (Cognate application 10909, 3rd April, 1958.) (867426.)

39178. Kienzle Apparate G.m.b.H.—Electronic denominational distributor for calculator. 17th December, 1957. (867970.)

40223. Central Electricity Generating Board, Wiseman, J. E. T., and Hanstead, P. D.—Apparatus for material testing by magnetic means. 10th February, 1959. (866570.)

## 1958

597. Eitel-McCullough, Inc.—Electron tube socket. 7th January, 1958. (866360.)

601. Soc. Nationale de Constructions Aéronautiques du Nord.—Method and apparatus for electric resistance welding of metal parts. 7th January, 1958. (867588.)

3142. Philips Electrical Industries, Ltd.—Variable inductance devices. 30th January, 1958. (867999.)

5602. Soc. d'Etudes et de Participations Eau, Gaz, Electricité Energie S.A.—Controlling of installations comprising at least one free piston gas-generator and a turbine driven by power gas produced by the gas-generator. 20th February, 1958. (866743.)

6621. Telefonaktiebolaget L. M. Ericsson.—Electrical networks for producing pre-selected harmonics and sub-harmonics. 28th February, 1958. (867611.)

8388. Bosch G.m.b.H., R.—Semiconductor assemblies. 17th March, 1958. (866455.)

10854. British Insulated Callender's (Submarine Cables), Ltd.—Manufacture of electric cables. 2nd April, 1959. (866367.)

11771. Central Electricity Generating Board, Lucas, D. H., and Peplow, M. E.—Thermocouple systems. 6th July, 1959. (867402.)

12465. Cole, Ltd., E. K., and Saunders, P. W.—Electronic pulse-counting apparatus. 20th April, 1959. (867612.)

12602. I-T-E Circuit Breaker Co.—Circuit-breakers. 21st April, 1958. (868000.)

12920. Brown, Boveri & Cie. A.G.—Air-blast circuit-breaker with auxiliary interruptor for parallel resistors. 25rd April, 1958. (866368.)

14060. Philco Corporation.—Electrolytic shaping of bodies. 2nd May, 1958. (866382.)

19225. Elektroskandia A.B.—Air break electric circuit-breaker. 16th June, 1958. (867793.)

19599. Chamberlain & Hookham, Ltd., and Lewis, H. S.—Electrical transformers. 19th June, 1959. (866399.)

21088. General Electric Co., Ltd.—Thermo-electric devices for measuring thermal radiation. 30th June, 1959. (Addition to 834134.) (867712.)

23163. Associated Electrical Industries, Ltd.—Junction type transistors. 9th July, 1959. (866496.)

24122. United Kingdom Atomic Energy Authority.—Nuclear reactor fuel element discharging arrangements. 10th July, 1959. (866541.)

25857. Telegraph Condenser Co., Ltd., and Sporing, P. A.—Electrical condensers. 23rd July, 1959. (866542.)

27782. Babcock & Wilcox, Ltd.—Plants including nuclear reactors. 27th August, 1959. (866316.)

28331. A.E.I.-John Thompson Nuclear Energy Co., Ltd.—Manufacture of nuclear fuel elements. 3rd September, 1959. (866554.)

28798. Associated Electrical Industries, Ltd.—Electrically heated ovens. 19th August, 1959. (866728.)

28890. Rhodes, P.—Refrigeration apparatus. 4th December, 1959. (867720.)

28924. Dimplex, Ltd.—Support members for radiators. 9th September, 1959. (867940.)

29593. United States Atomic Energy Commission.—Thermonuclear reactor. 16th September, 1958. (866544.)

29645. Stickel, H. A.—Switching devices. 16th September, 1958. (867721.)

29646. Secode Corporation.—Switches for code selective devices adapted to respond to particular call signals. 16th September, 1958. (867722.)

30161. Nettle Accessories, Ltd.—Electric lampholders. 31st August, 1959. (867631.)

30735. Marconi Instruments, Ltd.—Miller integrator feedback circuit arrangements. 26th May, 1959. (867406.)

30829. General Electric Co., Ltd.—Electric hotplates. 17th September, 1959. (867407.)

32234. Hawker Siddeley Nuclear Power Co., Ltd.—Control means in nuclear reactors. 6th October, 1959. (866644.)

32292. A.E.I.-Hotpoint, Ltd.—Electric immersion heaters. 23rd September, 1959. (866439.)

33354. Santon, Ltd.—Rotary electric switches. 20th October, 1959. (867890.)

34074. General Electric Co.—Rotor and stator construction of gas turbine engines. 24th October, 1958. (867600.)

[Continued on page 855]



# NOW BERRY'S INTRODUCE MAGIFLOW

The new  
one-gallon  
water heater



HERE IS MAGIFLOW—the latest newcomer to Berry's famous 'Magi' range of electrical appliances.

Trim good looks and top efficiency make the Magiflow the water heater more and more people are going to ask for. Its sleek design takes up less than a square foot of wall space—yet Magiflow can supply more than enough piping hot water for any average family, thanks to its exceptionally quick recovery.

First-class insulation and "magic eye" thermostatic control cut running costs to the absolute minimum. Check all the Magiflow's features and see why *this* is the water heater you should recommend.

**Capacity:** 1 gallon  
**Voltage:** 200-250V  
**Loading:** 2kW at 250V  
1.5kW at 200V  
**Size:** 17" high 7½" wide  
8" projection  
**Finish:** White or cream  
Chromium fittings  
Black, easy-to-clean,  
toughened plastic tap

*The Magiflow complies with B.B.S. 843 and 1010*

£10.16.6 plus P.T. £2.2.3

**PRICE: £12.18.9**

*Berry's*

## BERRY'S ELECTRIC MAGICOAL LTD

Water Heater Division · Touchbutton House · Newman Street · London · W.1

Tel: MUSEum 6800



**WHY FOIL FOR COILS?**  
**STABLE PRICE OF ALUMINIUM**  
**STRUCTURAL STABILITY**  
**MOISTURE-PROOF**  
**IMMUNITY TO INTERNAL SHORTING**  
**RAPID HEAT DISSIPATION**  
**USUALLY CHEAPER**

## **VENESTA FOILS LTD**

Put foil's top team to work for you!

Aluminium foil electrical coils, of almost any length and width, are an important new development in the electrical industry. Foil, with a thermo-setting insulating coating on one side, is wound into a reel like a roll of adhesive tape. The coils are then stoved to set the insulation. The result is a structurally stable block with no need for cheeks or formers, and immune to moisture and corrosion. Extreme accuracy—guaranteed to  $\pm 0.002$ in.—can be obtained by machining the coils on a lathe, while mild etching eliminates short circuiting. The difference in conductivity between copper wire and aluminium foil is offset by the better space factor of the rectangular section. There are no voids between the turns so heat diffuses evenly from turn to turn and from the middle to the ends, abolishing 'hot spots': the coils are thus tolerant of high temperatures and are easily cooled by fan or water. Low P.D. between adjacent turns makes foil coils inherently safe from internal shorting.

*WE OFFER YOU full technical advice and finished coils, or coated foil for your own winding*

WRITE OR 'PHONE FOR ONE OF OUR STAFF TO VISIT YOU.  
VENESTA FOILS LTD., THORN HOUSE, UPPER ST. MARTIN'S LANE, LONDON W.C.2. TEL: TEMPLE BAR 4399





## NEW PATENTS [Continued]

34262. Ericsson Telephones, Ltd.—Electrical signal integrating apparatus. 16th November, 1959. (866613.)

34527. Lazzarotto, A., and Lazzarotto, B.—Method of forming monoblock refractory linings for electric arc ovens. 28th October, 1958. (866614.)

34571. Sneath, O. B.—Transistor apparatus for producing trains of short current pulses. 28th October, 1959. (866375.)

34582. Frankmann, H.—Secondary electric batteries. 22nd June, 1959. (867385.)

35017. Schunk & Ebe G.m.b.H.—Brushes for electrical machinery. 31st October, 1958. (866374.)

35700. Babcock & Wilcox, Ltd.—Wall means and in panels for use in such wall means and nuclear reactors. 4th November, 1959. (867825.)

39691. Denis Ferranti Meters, Ltd., and Wolfenden, R. H.—Connection means for testing electricity supply meters. 23rd November, 1959. (866520.)

40190. Associated Electrical Industries, Ltd.—Electrical bridge circuit. 4th December, 1959. (866501.)

40690. Westinghouse Electric Corporation.—Insulation of electrical apparatus. 17th December, 1958. (866402.)

## 1959

2082. Sturtevant Engineering Co., Ltd.—Electrode assemblies for the electrolytic protection against corrosion of metal structure. 20th January, 1960. (866577.)

2992. Thorn Electrical Industries, Ltd.—Supports for suspended ceilings. 18th January, 1960. (866623.)

4937. Ellenberger & Poensgen G.m.b.H.—Pushbutton-operated overload switch. 12th February, 1959. Addition to 828754. (866733.)

5555. Union Carbide Corporation.—Apparatus for converting an electrical impulse or a series of periodic electrical impulses into a continuous pneumatic signal. 18th February, 1959. (866696.)

6216. Clausen, M. [trading as Danfoss Ved. Ingenior Mads Clausen].—Thermoelectrically controlled gas shut-off unit. 23rd February, 1959. (866697.)

8003. Commissariat à l'Energie Atomique.—Metallurgical furnaces for very high temperatures. 9th March, 1959. (866648.)

8569. Contraves A.G.—Electrical remote control systems for missiles. 12th March, 1959. (866698.)

12274. Marconi's Wireless Telegraph Co., Ltd.—Radio frequency oscillator arrangements. 29th October, 1959. (866630.)

19049. Sylvania Electric Products, Inc.—Electric-discharge lamps. 3rd June, 1959. (866466.)

19502. Westinghouse Electric Corporation.—Semiconductor devices. 8th June, 1959. (866467.)

19904. Steatite Research Corporation.—Printed circuit for array of toroidal cores. 10th June, 1959. (866468.)

20215. Standard Telephones & Cables, Ltd.—Negative impedance repeater for pulse multiplex circuits. 12th June, 1959. (866653.)

23999. Ribet et Desjardins.—Electrical attenuator circuits. 13th July, 1959. (866469.)

37228. Allmänna Svenska Elektriska A.B.—Electromagnetic contactors with movable contact bridges. 3rd November, 1959. (866487.)

37660. Zavody V.I. Lenina Plzen Narodni Podnik.—Voltage regulation systems for alternating current driving motors of electric locomotives. 6th November, 1959. (866639.)

42262. Welwyn Electric, Ltd.—Potentiometers. 11th December, 1959. (866341.)

43661. AMP, Inc.—Three-dimensional electrical circuit systems and modular units therefor. 23rd December, 1959. (866528.)

## 1960

4679. Babcock & Wilcox, Ltd.—Steam turbine power plants. 10th February, 1960. (866342.)

## NEXT WEEK'S EVENTS

Organisers of electrical functions are advised to make use of the "Electrical Review" clearing house, Room 243a, Dorset House, Stamford Street, London, S.E.1, to ascertain that the proposed dates for their functions do not clash with others already arranged

## MONDAY, 15th MAY

**Bristol.**—Grand Hotel, 8 p.m. A.S.E.E. Bristol and West of England Branch. "Diesel-electric Propulsion for Trains," by A. H. Bloomer.

**London.**—Institution Building, Savoy Place, W.C.2, 6.30 p.m. I.E.E. London Graduate and Student Section. Annual general meeting, followed by "The Experimental Investigation of Space," by P. J. Bowen.

Savoy Place, W.C.2, 5.30 p.m. I.E.E. Electronics and Communications Section. Papers on the banana tube colour television display system, by K. G. Freeman, H. Howden, K. G. Freeman and B. R. Overton, P. Schagen, R. N. Jackson, and B. A. Eastwell.

**Manchester.**—Nag's Head, Jackson's Row, 6.45 p.m. Society of Instrument Technology, Manchester Section. Annual general meeting followed by "The Thermocouple," by Dr. A. W. Foster.

## MONDAY, 15th to SATURDAY, 20th MAY

**Olympia.**—Grand Hall. Third International Hospital Equipment and Medical Services Exhibition.

## TUESDAY, 16th MAY

**Edinburgh.**—Carlton Hotel, 7 p.m. I.E.E. South East Scotland Sub-Centre. Annual general meeting followed by "Electricity Supply in India and its Future," by M. Datta.

**Farnborough.**—Technical College, 7 p.m. British Institution of Radio Engineers, Southern Section. Annual general meeting followed by "Electronic Techniques in the Measurement of Acoustic Noise," by K. R. McLachlan.

**Igham.**—George and Dragon, 7.30 p.m. A.S.E.E. West Kent Branch. Social evening.

**London.**—Great George Street, Westminster, S.W.1, 5.30 p.m. Institution of Civil Engineers. "St. Lawrence Power Project—Hydraulic Features," by O. Holden.

## TUESDAY, 16th to THURSDAY, 18th MAY

**Eastbourne.**—Public Transport Association. Conference.

## WEDNESDAY, 17th MAY

**Alperton.**—Woodside Place, 2.30 p.m. A.S.E.E. West London Branch. Visit to Synchronome, Ltd.

**London.**—Savoy Place, W.C.2, 5.30 p.m. I.E.E. Electronics and Communications

Section. "Air Traffic Control," by E. Eastwood and B. J. O'Kane.

School of Hygiene and Tropical Medicine, Keppel Street, Gower Street, W.C.1, 6 p.m. British Institution of Radio Engineers, Television Group. Discussion on "Television Wire Distribution Systems."

**Rochester.**—King's Head Hotel, High Street, 7 p.m. Institution of Plant Engineers, Kent Branch. "Electrical Regulations and Precautions," by G. T. Fisher.

**Sheffield.**—Grand Hotel, 6.30 p.m. I.E.E. Sheffield Sub-Centre. Annual general meeting followed by "Progress in Permanent Magnet Materials," by J. E. Gould.

**Torquay.**—S.W.E.B. Electric Hall, 3 p.m. I.E.E. South Western Sub-Centre. Film meeting.

## THURSDAY, 18th MAY

**Birmingham.**—Lecture Theatre, New College of Technology, Gosta Green, 7 p.m. Institution of Electronics. "Tunnel Diode Circuit Applications," by I. Aleksander.

**Blackburn.**—Castle Hotel, 7.30 p.m. Institution of Plant Engineers, Blackburn Branch. "Electronics," by J. Siddon.

**London.**—Savoy Place, W.C.2, 5.30 p.m. I.E.E. Annual general meeting, followed at 6.30 p.m. by "Experimental Investigation of Space," by J. A. Ratcliffe.

**Newcastle-upon-Tyne.**—Roadway House, Oxford Street, 7 p.m. Society of Instrument Technology, Newcastle Section. Annual general meeting.

## FRIDAY, 19th MAY

**London.**—Large Lecture Theatre, London School of Hygiene and Tropical Medicine, Keppel Street, Gower Street, W.C.1, 7 p.m. Institution of Electronics. "Aerial Techniques," by C. F. Whitbread.

## FRIDAY, 19th to SUNDAY, 21st MAY

**Brighton.**—Grand Hotel. Association of Supervising Electrical Engineers. Annual conference.

## FRIDAY, 19th to MONDAY, 22nd MAY

**Pitlochry.**—Pitlochry Hydro Hotel. I.E.E. Scottish Centre. Spring meeting.

## FRIDAY, 19th MAY to SUNDAY, 4th JUNE

**Moscow.**—Sokolniki Park. British Trade Fair.

## TRADE MARK APPLICATIONS

APPLICATIONS have been made for the registration of the following trade marks. Objections may be entered up to 3rd June.

**SNB Luxury Life** (design). No. 811,304. Class 7. Electrically operated food mixers, coffee grinders, hand-guided electrically operated hair-drying machines, electrically operated machines for the disposal of kitchen waste, washing machines, drying machines, rinsing machines and spraying machines.—S. N. Bridges & Co., Ltd., York Road, Battersea, London, S.W.11.

**Deronico.** No. 799,094. Class 9. Electrical and electronic apparatus.—V. W. Derrington, Ltd., 159 and 161, London Road, Kingston-on-Thames.

**Orthomode.** No. B808,047. Class 9. Microwave hybrid mixers.—Varian Associates, California, U.S.A. Address for service: Reddie & Grose, 6, Bream's Buildings, London, E.C.4.

**Datico.** No. 809,317. Class 9. Electronic apparatus for testing electronic, electrical, hydraulic, and mechanical systems.—Northrop

Corporation, California, U.S.A. Address for service: Stevens, Langner, Parry & Rollinson, 5 to 9, Quality Court, Chancery Lane, London, W.C.2.

**Emiclear.** No. 814,728. Class 9. Apparatus, instruments and devices for reproducing and amplifying sound.—Electric & Musical Industries, Ltd., Blyth Road, Hayes, Middx.

**Furmax** (design). No. 815,374. Class 9. Magnetic alarms and combination switchgear.—Furmax Alarm Co., Ltd., 34, High Street, Steyning, Sussex.

**Polyop.** No. 815,665. Class 9. Electrical and electronic apparatus and instruments.—De Havilland Aircraft Co., Ltd., Hatfield Aerodrome, Hatfield, Herts.

**Elemod.** No. 816,705. Class 9. Electric modulators.—Telephone Manufacturing Co., Ltd., Hollingsworth Works, Martell Road, West Dulwich, London, S.E.21.

Design including **Induction.** No. B802,724. Class 11. Electric induction furnaces.—British Geco Engineering Co., Ltd., Kent House, Station Road, Edenbridge, Kent.



# CONTRACT INFORMATION

## Accepted Tenders and Prospective Electrical Work

### CONTRACTS OPEN

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses

**Burma.**—Union of Burma Purchase Board. 22nd May. Cable. (E.S.B. 14941/61.)\*

**Coulsdon and Purley.**—U.D.C. 29th May. Group "A" sodium lighting at Coulsdon and Sanderstead. (See this issue.)

**Ealing.**—Corporation. 30th May. Lamps and control gear for sodium street lighting. (See this issue.)

**Essex.**—County Council. 20th May. Renewal of electrical installations in Margaret Tabor County Secondary School, Braintree; King's Road County Primary School, Chelmsford; and Hedingham County Secondary School. (See this issue.)

**Formosa.**—Central Trust of China. 1st June. Telephone equipment. (E.S.B. 14518/61/I.C.A.)\* 8th June. Transmission line cleaning equipment. (E.S.B. 14975/61/I.C.A.)\*

**Greece.**—Supply Committee, Social Insurance Institute. 13th June. 200 electric water boilers. (E.S.B. 14185/61.)\*

**India.**—Madras State Electricity Board. 25th May. Porcelain insulators. (E.S.B. 14192/61.)\* 8th June. Insulators. (E.S.B. 14552/61.)\*

**Gujarat Electricity Board.** 29th May. Switchboard panels. (E.S.B. 14509/61.)\*

**Atomic Energy Establishment, Trombay.** 5th June. Welding transformers. (E.S.B. 14506/61.)\*

**India Store Department.** 12th June. A.f. attenuators. (See this issue.)

**National Coal Development Corporation, Ltd.** 28th May. Cable. (E.S.B. 14575/61.)\*

**Singareni Collieries Co., Ltd.** 28th June. Five 75 kW silicon transformer rectifier units. (E.S.B. 14901/61.)\* 30th June. Four 500 kVA transformers. (E.S.B. 14903/61.)\*

**Rajasthan State Electricity Board.** 8th June. (E.S.B. 14560/61.)\*

**U.P. State Electricity Board.** 19th June. Transmission line. (E.S.B. 14559/61.)\*

**Iraq.**—Ministry of Defence. 28th June. Telephone equipment. (E.S.B. 14538/61.)\*

**Italy.**—N.A.T.O. Infrastructure Contract. Thirteen transceivers (Contract 9961). Applications to tender by 26th June. (G.D. 363/61 (116).)†

**Kent.**—County Council. 22nd May. Street lighting at Walderslade. County surveyor, County Hall, Maidstone.

**London.**—Lewisham Borough Council. 25th May. Street lighting conversion from mercury to sodium and erection of 81 Group "A" columns with 200 W sodium lanterns. (See this issue.)

**Malaya.**—Department of Broadcasting. 6th June. Transmitters and ancillary equipment. (E.S.B. 14592/61.)\*

**Manchester.**—Corporation. 29th May. Electrical installation in the aged persons' home, Felskirk Road, Wythenshawe. City architect, P.O. Box 488, Town Hall.

**New Zealand.**—G.P.O., Wellington. 7th June. Loading coils. (E.S.B. 14984/61.)\*

**Nigeria.**—Electricity Corporation. 9th June. 21,000 house service meters. (E.S.B. 14597/61.)\* 12th June. Construction of power line and substation. (E.S.B. 14984/61.)\*

\* This information is extracted from the Board of Trade *Export Service Bulletin*. Inquiries should be addressed to the Board of Trade, Export Services Branch, Lacon House, Theobald's Road, London, W.C.2 (Telephone: Chancery 4411, Ext. 738), quoting the reference given. †Telephone: Trafalgar 8855, Ext. 2010.

**Pakistan.**—Water and Power Development Authority. Three 138,000 h.p. vertical shaft water turbines and three 100 MW generators for Mangla Dam project. Firms wishing to be placed on the list of tenderers should apply to the mechanical and electrical consultants not later than 30th June. (See this issue.)

**West Pakistan Railway.** 30th May. Batteries. (E.S.B. 14591/61.)\*

**St. Albans.**—Corporation. 1st June. Group "A" concrete street lighting columns. (See this issue.)

**South Africa.**—Stores Department, South African Railways. 2nd June. Cable and accessories. (E.S.B. 14537/61.)\* 16th June. Radio-telephone equipment. (E.S.B. 14198/61.)\*

**Union Tender Board.** 5th June. Radio valves and components. (E.S.B. 14536/61.)\*

**Worksop.**—Borough Council. 26th May. Lighting equipment. (See this issue.)

### ORDERS PLACED

**Durham.**—County Education Committee. Electrical work in Shildon County and Modern Schools (£3,645).—Cox-Walkers.

**Gateshead.**—Education Committee. Electrical installation at Fell Dyke Junior School (£3,927).—Robson & Coleman.

**Sunderland.**—Corporation. Electrical installations in 305 houses on the Town End Farm estate.—John Calvert (Electrical).

### WORK IN PROSPECT

*Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors*

**Acton.**—Rebuilding business premises, Acton High Street; Montagu Burton, Ltd., Hudson Road, Leeds, 9.

**Bath.**—Flats and maisonnettes (70), Twerton-Whiteway estate; city architect.

**Broadstairs and St. Peters.**—Flats for old persons (20), Northdown Hill estate; H. C. Norris, clerk, Pierremont Hall, Broadstairs, Kent.

**Carlisle.**—Motel, on former aerodrome site; Jackson & Saul (solicitors for promoter, Mr. J. W. Richardson), 29, Fisher Street.

**Connah's Quay.**—Construction of new Council offices; J. G. L. Poulson, architect, 29, Ropergate, Pontefract.

**Coventry.**—First instalment of Walsgrave C. of E. Primary School; city architect, Council House.

**Cranbrook.**—Houses (47), Freight estate, Cranbrook, Cleavers estate, Sissinghurst and All Saints estate, Hawkhurst; K. Barnes, architect to Council, Council Offices, Hill House, Cranbrook, Kent.

**Dunfermline.**—Factory, Albeath Road; Monotype Corporation, Ltd., Salfords, Redhill, Surrey.

**Durham.**—Proposed factory; Blagdon-Durham, Ltd., engineers, Framwellgate Works, Durham.

**Eccles.**—Extensions to Lankro Chemical Works, Bentscliffe; Wm. Snape & Sons, Ltd., Clifton House.

**Erith.**—Technical Institute; Charles Pike & Partners, architects, 14, Lincoln's Inn Fields, London, W.C.2.

**Eston (Yorks.).**—Flatlets (60); N. C. Harrison, surveyor, 246, Normanby Road, South Bank-on-Tees.

**Folkestone.**—Municipal offices, Castle Hill

Avenue; D. McMorran & G. Whitby, architects to Council, 14, North Audley Street, London, W.1.

**Frinton-on-Sea.**—Luxury flats (60), The Esplanade; Ronald Ward & Partners, architects, 29, Chesham Place, London, S.W.1.

**Gateshead.**—Shopping development scheme involving 52 new shops, High Street and Jackson Street area, for Millerdale Properties, Ltd., and the E. Alec Coleman companies; H. O. Ludor, architect, 79, Regency Street, London, S.W.1.

**Hayes and Harlington.**—Flats (86), Uxbridge Road; surveyor, Town Hall, Hayes, Middlesex.

**Hove.**—Flats (52), Hardwick Road; borough engineer.

**Hyde.**—Laboratories and offices; James North & Sons, Ltd., Godley Works.

**Immingham.**—Alterations to St. Andrew's C.E. School (£22,610); county architect, Lincoln.

**Kidlington.**—County fire brigade headquarters (£122,000); county architect, County Hall, Oxford.

**King's Lynn.**—Four blocks of three-storey flats, Oak Circle, Gaywood Park, and two blocks of maisonnettes, Sadler's 'Close, Seabank estate; housing architect, Clifton House, Queen Street.

**London.**—Headquarters building, Albany Street, Regents Park, Royal College of Physicians; Denys Lasdun, architect, 3, Albany Terrace, N.W.1.

Office block, Rochester Row, Westminster; Bernard Sunley & Sons, Ltd., 25, Berkeley Square, W.1.

Flats (44), Donnington Road, Willesden; borough engineer.

**Loughborough.**—Infants' school, Beacon Road; county architect, Leicester.

**Luton.**—Flats (136), Dallow Road; Abbey Homesteads, Ltd., 15, Thayer Street, London, W.1.

**Macclesfield.**—Works, Hurdsfield estate; Imperial Chemical Industries, Ltd., Ship Canal House, King Street, Manchester.

**North Riding.**—Additions to George Pindar Modern School; Gollins, Melvin, Ward & Partners, architects, 15, Manchester Square, London, W.1.

**Norwich.**—Flats and maisonnettes (76), Midland Street/Devonshire Street site; D. Percival, city architect.

**Nottingham.**—Civic theatre (£357,435); W. J. Simms, Sons & Cooke, Ltd., Haydn Road, Sherwood.

**Oxford.**—New headquarters in Old Road, Headington, for the Regional Hospital Board; Gollins, Melvin, Ward & Partners, architects, 15, Manchester Square, London, W.1.

**Paignton.**—County secondary school for girls; Devon county architect, Heavitree Road, Exeter.

**Sedgley.**—Extension of Park Hall Hotel, Goldthorn Park; Shipley & Foster, architects, Kings Court, Bridge Street, Walsall.

**Taunton.**—Office block, Mary Street (£245,000); Architects' Department, Ministry of Works, Abell House, John Islip Street, London, S.W.1.

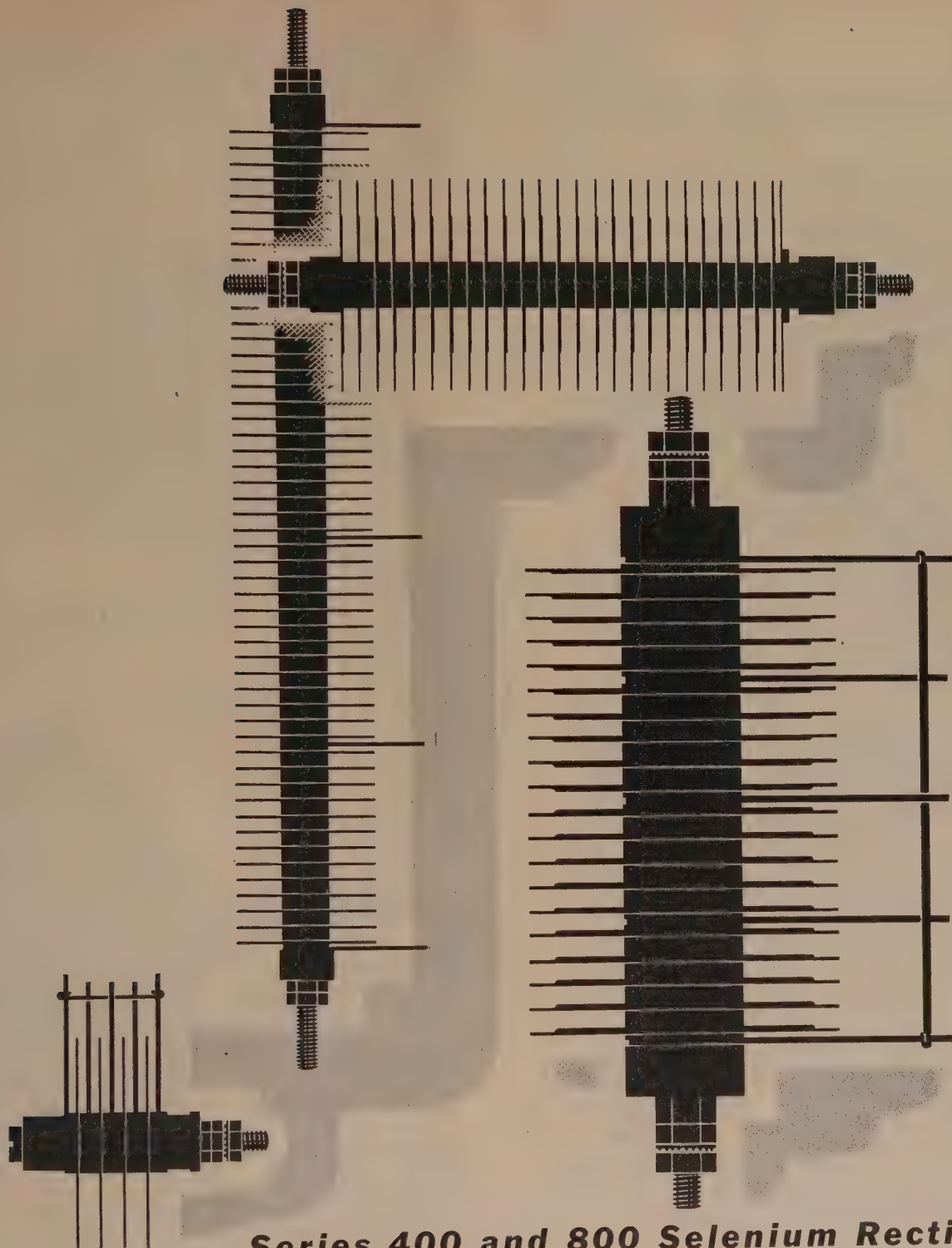
**Tynemouth.**—Proposed St. Mary's R.C. primary school; D. Brown, architect, 10, Lambton Road, Jesmond, Newcastle-on-Tyne.

**West Bromwich.**—Housing estate, Spout-house Lane; Coal Industry Housing Association, Hobart House, London, S.W.1.

Maisonnettes (182), Ebenezer Street; Five Oaks Estates, Ltd., Birmingham New Road, Coseley.

**Wood Green.**—Flats (52), Winkfield/Acacia Roads and Commerce Road; borough engineer, Town Hall, Wood Green, N.22.





## Series 400 and 800 Selenium Rectifiers

*SenTerCel* Series 400 and Series 800 rectifier stacks are made from two new ranges of square plates which, because of their improved performance, permit considerable savings in space, weight and cost.

- \* Fully comprehensive range of plate sizes.
- \* Available with or without cooling fins.
- \* Savings in space, weight and cost.
- \* Supplied ready wired or bus-barred.
- \* Simplified connection arrangements.



Write or 'phone for relevant technical publications.



60/7MF

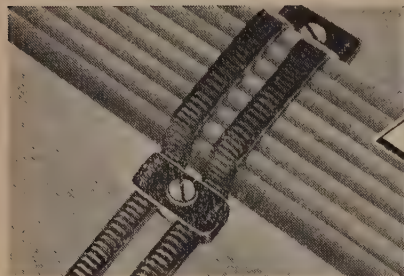
## Standard Telephones and Cables Limited

Registered Office: Connaught House, Aldwych, London, W.C.2

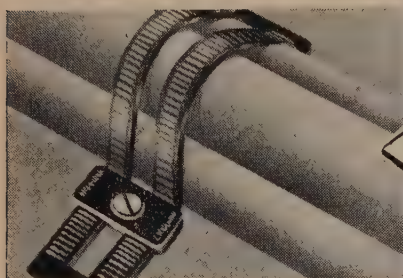
RECTIFIER DIVISION: EDINBURGH WAY · HARLOW · ESSEX



## complete cable security —



with  
increased  
efficiency  
and



reduced  
costs

# Insuloid

## Type **as** saddles

2 POINT 2 SCREW FIXING

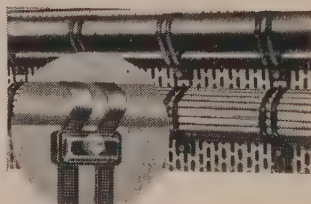
- The quickest most convenient, most versatile and economical Cable securing method yet available. Designed specially for wall and panel mounted wiring installations, the AS Cable Saddle will accommodate cables of any diameter, type or combination, providing complete security with the highest insulation and anti-corrosive qualities in any climatic conditions. Only 3 sizes are required to cover the most complex cable assembly.
- ★ Save time
  - ★ Increase efficiency
  - ★ Greater versatility
  - ★ Made from immensely strong nylon
  - ★ Lighter and stronger than metal
  - ★ Absolutely anti-corrosive
  - ★ Self-tensioning straps
  - ★ No need to carry large stocks of components

## .. or Type **sas** saddles

TWO POINT SINGLE SCREW FIXING

Developed from type AS above, but specially adapted for use with standard cable racking.

The type SAS Cable Saddles will efficiently secure with a single screw, cables of any diameter or diameters in even less time than ever before. Only two sizes are required to cover all requirements.



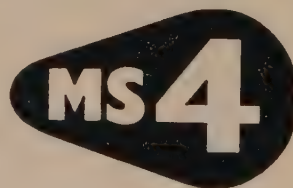
Send for fully descriptive literature

**INSULOID MANUFACTURING CO. LTD.**

Sharston Works, Leastone Road, Wythenshawe, Manchester  
Tel.: WYT 2842 & 3163



with the NEW  
**AMBERSIL**



**AEROSOL**

**Multi-Purpose**

## SILICONE GREASE SPRAY

In electrical and electronic equipment ingress of moisture, corrosion and oxidation are primary causes of breakdown. The introduction of AMBERSIL MS 4 Aerosol Spray provides an "easy to apply" non-melting silicone grease with excellent dielectric properties and a working temperature range of  $-50^{\circ}\text{C}$  to  $+200^{\circ}\text{C}$  for waterproofing, insulating, lubricating and preserving electrical and electronic equipment. One pass from the handy 12oz. aerosol gives an uncontaminated film, even in inaccessible areas, ensuring complete protection with economy and simplicity in application.

Write or 'phone for full information to:

**AMBER OILS LIMITED**  
(Ambersil Division)

11A, ALBEMARLE STREET, LONDON, W.1  
Telephone: MAYfair 6161/5



**NEW!****4-WAY, 5 & 13 AMP, FUSED, SOCKET OUTLETS**

Patent Applied For

4 way, 5 amp, Fused  
Socket Outlet

Size: 5" x 5" x 1 1/4"

Weight: 2 lbs. 4 ozs.

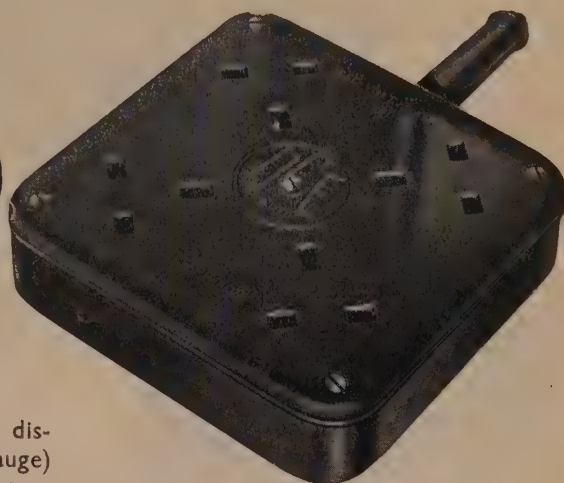
**PRICE (NETT TRADE) Cat. No.**

Rubber ... 45/- each 5R

Neoprene\* ... 55/- each 5N



A revolutionary, 4 way, distribution unit (B.S.S. Gauge)  
Ideal for Aircraft, Motor-Car, Engineering, Ship & Boat Building Industries, etc.

4 way, 13 amp, Shuttered, Fused  
Socket Outlet

Size: 5" x 5" x 1 3/8"

Weight: 2 lbs. 8 ozs.

**PRICE (NETT TRADE) Cat. No.**

Rubber ... 55/- each 13R

Neoprene\* ... 65/- each 13N

**ADVANTAGES:**(1) *As an extension lead:*—

Temporary long leads are often required in workshop, factory, laboratory, garage, hotel, attic, etc., where portable tools, handlamps, electrical equipment, photographic lighting, vacuum cleaners, etc., are used.

In most large works, hangars, garages and factories, portable tools, handlamps, etc. usually require long leads, if they are to be able to reach everywhere. By using a 4 way socket outlet as an extension lead, the necessity to have long leads on all portable equipment is eliminated, thus effecting a considerable saving of cable, which pays the cost of a 4 way socket outlet, many times over.

(2) *As a safe means of providing multiple outlets:*—

They are ideal for those many applications in the factory, aircraft hangar, photographic studios, research laboratories, teaching establishments, etc. — where this necessity frequently arises.

The "knock-outs" in the base enable it to be used either, screwed to a flat wall or other surface; or hung by passing a leather thong through two of the "knock-outs".

\*Neoprene sockets are impervious to oils and corrosives.

- All contacts totally enclosed
- Easily accessible, self-contained fuse
- Unbreakable central cable lock
- Sets a new standard in safety
- Solid Rubber or Neoprene

**CONSTRUCTION:**

The Sockets are formed from brass strip, mounted edgewise, in "ring-main" fashion, continuous from pin socket to pin socket; set in recesses and channels, in the solid rubber or neoprene base. There are no rivets, screws or joints at the pin sockets, thus eliminating any possibility of failure or short circuits.

These units can be subjected to the roughest treatment, even to driving a 10 ton lorry over them. They are indestructible, portable, and suitable for any situation, whether loose on workshop floor, or secured to walls, panels, etc.

**Cablelock:** An ingenious, internal, cable-locking device, in which the incoming cable is looped completely around a central insulated post, without crushing; positively prevents cable pulling out or direct strain being applied to the mains cable terminals. Cable protected at point of entry, by flexible sleeve.

Overloading impossible; fitted with fuse on the line side, quickly replaced if overloaded and blown.

The Cover is held by 5 CSK Screws.



AVAILABLE FROM YOUR USUAL E.W.F. ELECTRICAL WHOLESALER OR FROM:—

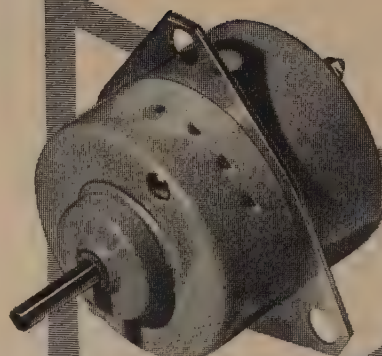
**BRITISH CENTRAL ELECTRICAL Co. Ltd**

6/8 ROSEBERY AVENUE, LONDON, E.C.1 Tel: Terminus 3666 (20 lines) EST. 1908

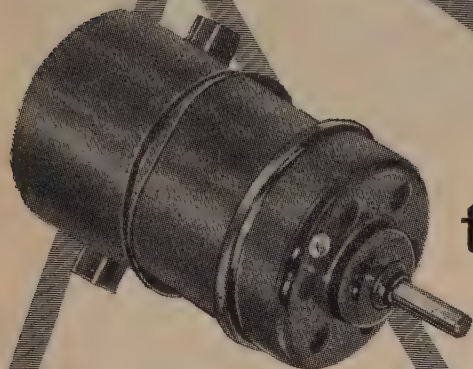




Delco 625 Type

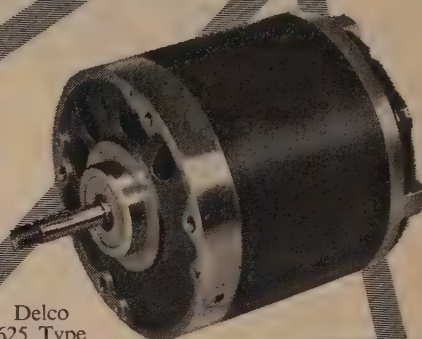


Delco 258 Type

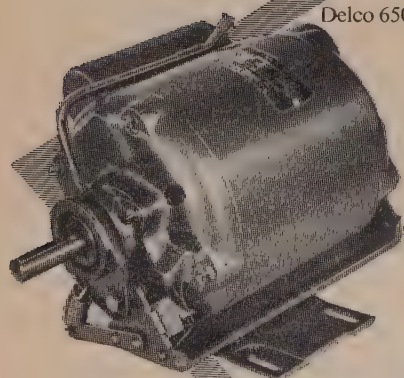


Delco 310 Type

tailored  
to fit  
your  
product

Delco  
625 Type  
(Special Purpose)

# DELCO electric motors



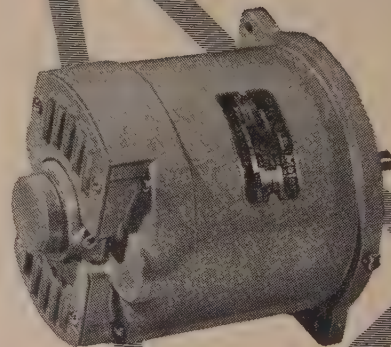
Delco 650 Type

Whether you are designing a new motorised appliance or re-designing an old one, there's a Delco motor ready made for your product... or one that can easily be tailored to fit perfectly. For informative literature on the Delco range please write to the address below. For expert advice on your power problems call in a Delco motor engineer TODAY.

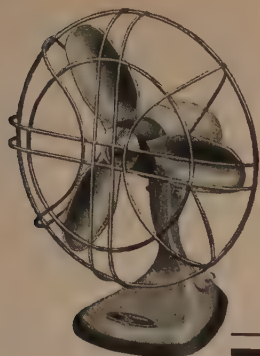
#### Delco Motors

##### are suitable for driving

Washing Machines; Spin Driers;  
Food Mixers; Projectors;  
Refrigerators; Air Conditioners;  
Oil Burners; Fans; Office Machinery;  
Lawn Mowers; Furnace Blowers;  
Water Pumps; Farm Machinery;  
Waste Disposal Units;  
Vegetable Peelers and many other  
domestic and industrial applications.

Delco  
Oil Burner  
Type





### "Princeway" Desk Fans

10 INCH NON-OSCILLATING	£4.19.6	PLUS 18/- P.T.
12 INCH NON-OSCILLATING	£7. 4.0	PLUS 26/- P.T.
12 INCH OSCILLATING	£9. 5.0	PLUS 33/4 P.T.

—Now is the time to order!

## METWAY FANS

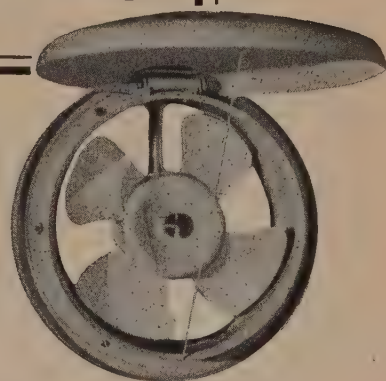
### "Coolerway" Extractor Fans

"COOLERWAY STANDARD"	£5.19.6
"COOLERWAY ROYAL"	£6.19.6
"COOLERWAY DE-LUXE" (Reversible)	£10.19.6

Are you getting your share of  
the Coolerway sales?

● FOR FULL DETAILS OF ALL METWAY FANS WRITE FOR OUR NEW CATALOGUE DAR/35ER

**METWAY • KEMP TOWN • BRIGHTON**



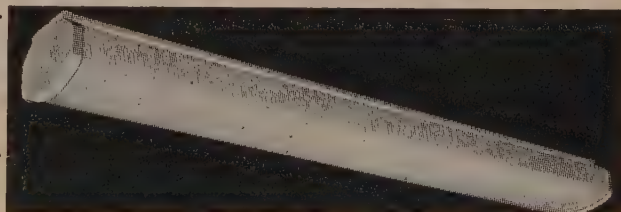
**BRITAIN'S BEST  
FLUORESCENT LIGHTING  
FITTINGS & CONTROL GEAR**

Starter switch  
type choke  
incorporating  
starter holder.

Starter switch  
type high  
power factor  
ballast unit.

Choke with  
instant start  
transformer  
unit.

Britain's best range  
of Fluorescent Fit-  
tings selected for  
efficient lighting by  
famous concerns  
all over the world



**Model EP.802** Suspended or ceiling fitting with opal fluted diffusing cover



**Model D.2125** Twin 8ft. 125 watt batten fitting



**Model VP.802** Industrial vapour-proof totally enclosed fitting

**UTILITIES (LONDON) LTD.**

Manufacturing Electrical Engineers

TUNSTALL ROAD • BRIXTON

LONDON • S.W.9

Telephone : Brixton 6811-4

Telegrams : Utilon, London, S.W.9





MANUFACTURERS OF  
OIL AND GAS FURNACES  
SINCE 1885

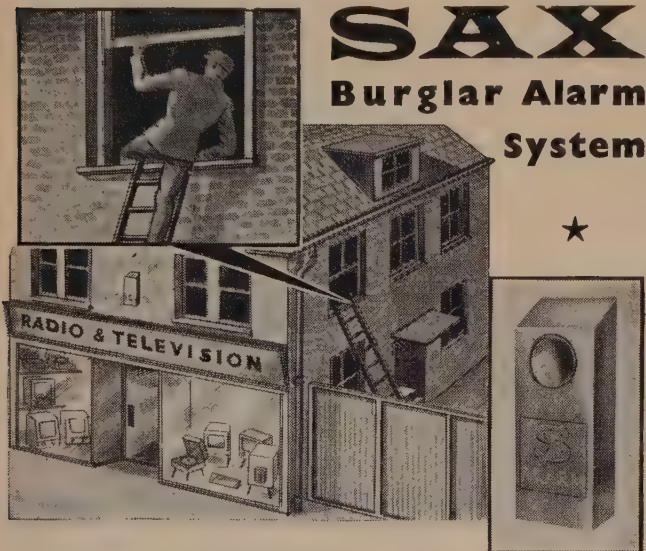
We recommend  
**SHELL-MEX AND B.P. GASES LTD.**  
**PROPAGAS PROPANE**  
for details apply: **SHELL-MEX AND B.P. GASES LTD.**  
Cecil Chambers, 76-86 Strand, London.WC.2.

**TYERS** LIQUID GAS  
EQUIPMENT

**THE PORTABLE FURNACE AND PATENTS CO.**  
CARRINGTON, NOTTINGHAM  
ENGLAND

Telephone:-  
NOTTINGHAM 64887

Telegrams:-  
'FURNACE', 'NOTTINGHAM'



**SAX**  
Burglar Alarm  
System



Advice and Prices  
also diagrammatic  
layouts on request



A climb to a window is no deterrent  
to a burglar and shops or buildings  
with rear premises need that extra  
security which SAX Burglar Alarm  
System can give to safeguard  
valuable stock.

**JULIUS SAX & CO. LTD.** 24 COMMERCE RD.,  
BRENTFORD, Middx

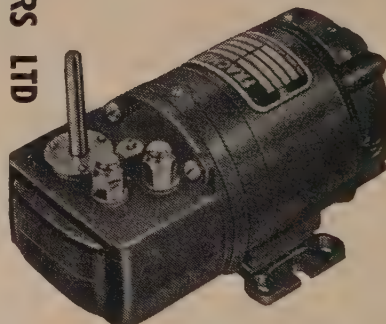
Telephone: ISLeworth 6034/5

FRACTIONAL H.P. MOTORS LTD

**FRACMO MOTORS**

Our very wide range includes:

A.C./D.C. Universal, Split Phase, Three  
Phase, Capacitor, Synchronous and  
Shaded Pole Motors 1/250 h.p. to 1/3 h.p.,  
also Geared Units, 0.125 to 600 r.p.m.  
with Torque up to 850 lbs./ins.



**FRACTIONAL H.P. MOTORS LTD**

Rookery Way, Hendon, N.W.9. Phone: COLindale 8022/3/4.

Agents: Law & Plumtree, "Glenholme," Holme Road, Matlock Bath,  
Derbyshire, Matlock 326

DaF12561 ER

**QUICKEST, SAFEST, EASIEST TO USE FOR EVERY GAUGE WIRING**



**SCRUIT**

ONE PIECE PORCELAIN CONNECTORS BRITISH MADE

**V.G. PORCELAIN CO. LTD** GORST RD., PARK ROYAL, LONDON, N.W.10. Tel: ELGAR 1411/7 (Seven Lines)

Distributors: S.O. Bowker Ltd., Gee (Birmingham) Ltd., Birmingham, and Metway Ltd., Brighton.



# Reliability IN SPACE TRAVEL

Now that MAN has broken through  
the space barrier, reliability  
in operation must be the keystone  
of all future progress.

WANDLESIDE Cables are used in  
connection with current  
U.S.A. and U.K. Rocket Propulsion  
Space Research projects.



**WANDLESIDE CABLES**

*for every  
purpose*

WANDLESIDE CABLE WORKS LTD. 106 GARRATT LANE WANDSWORTH LONDON SW18

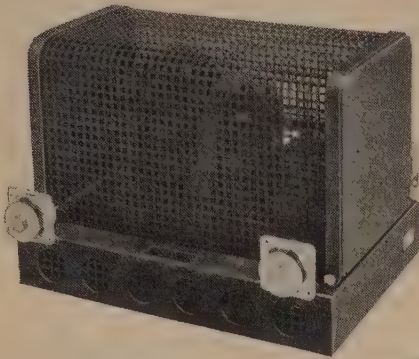
One of FALKS Group

Telephone: VANDyke 7544 (7 lines) Telegrams: Wandleside, London

In Association with Irish Cables Ltd., Wandleside Warren Wire Co. Ltd., and Wandleside National Conductors Ltd.



## Why does travel Blue Pullman?



Two Newton Derby Automatic Voltage Regulators are installed in each of the new Diesel Electric Pullman Trains built by the Metropolitan-Cammell Carriage and Wagon Co. Ltd. for the Pullman Car Company Ltd. These regulators monitor the charging voltage from G.E.C. generators to the main batteries, which power the traction control equipment, including the diesel starting motor.



**NEWTON  
DERBY**

**NEWTON BROS. (DERBY) LIMITED · ALFRETON ROAD, DERBY**

Telephone: DERBY 47676 (4 lines) Grams: DYNAMO DERBY  
London Office: IMPERIAL BUILDINGS, 56 KINGSWAY, W.C.2

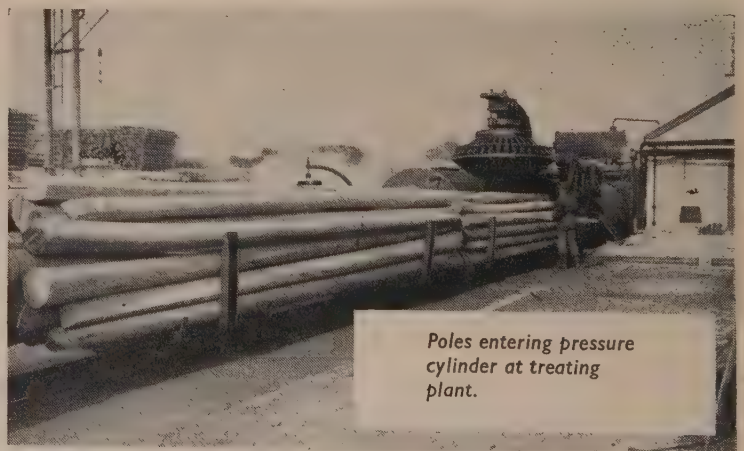
• Servo Motors • Permanent Magnet Alternators • Motor Generator Sets  
• Automatic Voltage Regulators • Transistor Convertors • Rotary Transformers and Convertors • High Frequency Alternators (400 to 3,000 c.p.s.)

## THE TEST OF TIME

For more than a century, Burt Boulton & Haywood Ltd. have maintained their leadership in the timber preservation field. For his pioneer efforts as early as 1853, Mr. H. P. Burt was honoured by the Institute of Civil Engineers. Today's experts favour pressure impregnation with Creosote for Telegraph/

Transmission Poles and timber in contact with the ground. In the final analysis, it is the supreme test of time on the treated wood that really counts. This is where Burt Boulton & Haywood leave nothing to chance. Their scientific methods have been successfully tried and tested for decades.

- **A CENTURY'S EXPERIENCE** guides today's experts in preservation.
- **MODERN WORKS** extensively equipped to serve your needs.
- **METICULOUS CONTROL** maintained throughout all stages of treatment.



Poles entering pressure cylinder at treating plant.

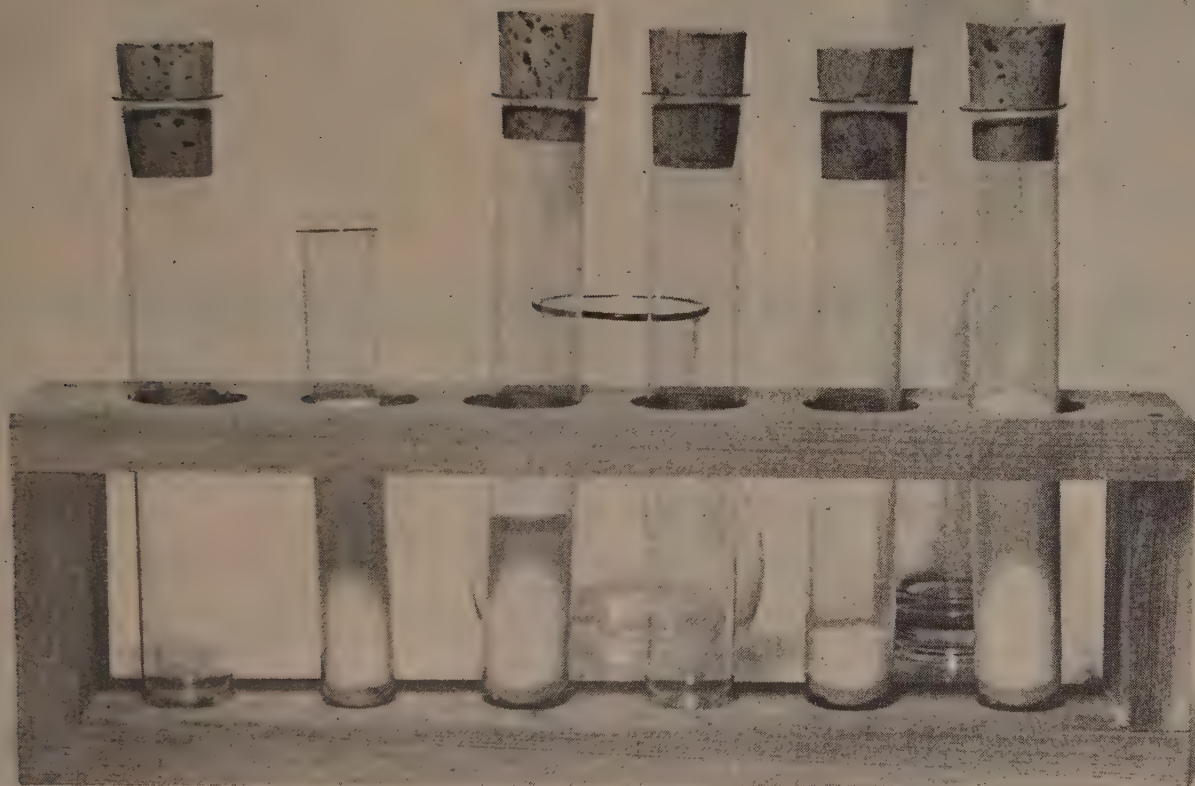
## Burt Boulton & Haywood Ltd

**PRESERVATION FACILITIES AT:** Belvedere (Kent), Eling (near Southampton), Newport (Mon.) and West Hartlepool

**HEAD OFFICE:** Brettenham House, Strand, London, W.C.2. Tel: Temple Bar 5801



# REGULATORS FOR MONSANTO CHEMICALS — BY BRENTFORD



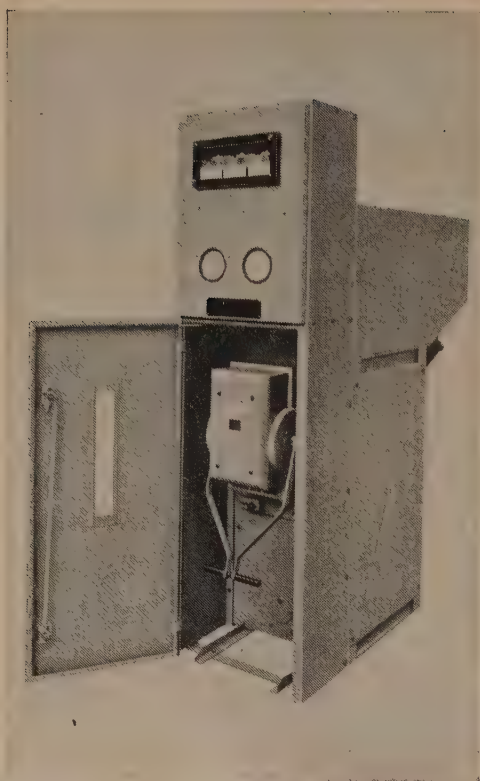
As part of their modernisation plans for their Newport (Mon.) works, Monsanto Chemicals have taken advantage of the higher efficiency of semi conductor rectifiers. They have installed a Westinghouse Brake & Signal silicone rectifier and, to control it, a Brentford Interstep Voltage Regulator.

**Technical details.** This Brentford Regulator is rated for a load of 4,000 k.V.A. It provides stepless control from 4,000 to 11,000 volts to the primary of the rectifier transformer which is arranged for 12 phase working. Brentford Transformers Ltd., Manor Royal, Crawley, Sussex. Crawley 25121.

# BRENTFORD

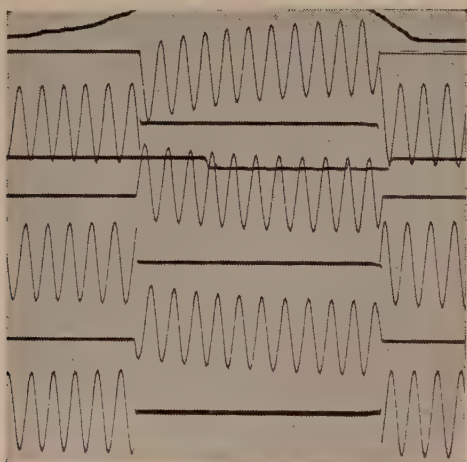






Testing plays a larger part in the development of switchgear than of most plant. And it is not a matter of subjecting a circuit-breaker to a heavy overload to see whether it blows up. On the contrary, to the non-specialist observer a test is an almost ludicrous anti-climax. The build-up is impressive; long preparation, elaborate fire precautions, the switchgear itself as distant as the target in a rifle range and watched through armoured glass. A warning hooter clears the site. Then the test engineer presses a control switch... in complete silence absolutely nothing happens, and the test—another 'shot'—is over. But a battery of oscillographs has recorded on photographic film a complete history of everything of importance that happened inside the switch. This is one approach to...

## This thing called know-how



Any new design or improvement of an existing one involves many such tests of numerous detailed innovations. They are the means by which the designer checks his work as it proceeds. Ready access to test facilities is thus an essential of his work. We are fortunate in having at Chelmsford one of the most up-to-date (ASTA) testing stations in the country, and this has played a most important part in the evolution of all our switchgear. But there is another side to know-how which comes from sheer experience—and we have had 80 years of that.

# Crompton Parkinson

LIMITED



Makers of Electric Motors of all kinds, A.C. and D.C. Generators, B.E.T. Transformers, Switchgear, Cables, Instruments, Lamps, Lighting Equipment, Batteries, Stud Welding Equipment, Traction Equipment, Ceiling Fans.

CROMPTON PARKINSON LTD., CROMPTON HOUSE, ALDWYCH, LONDON, W.C.2.





*now*

## 'MUTAC CLIPPER'

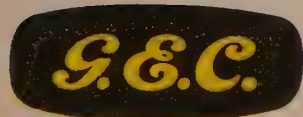
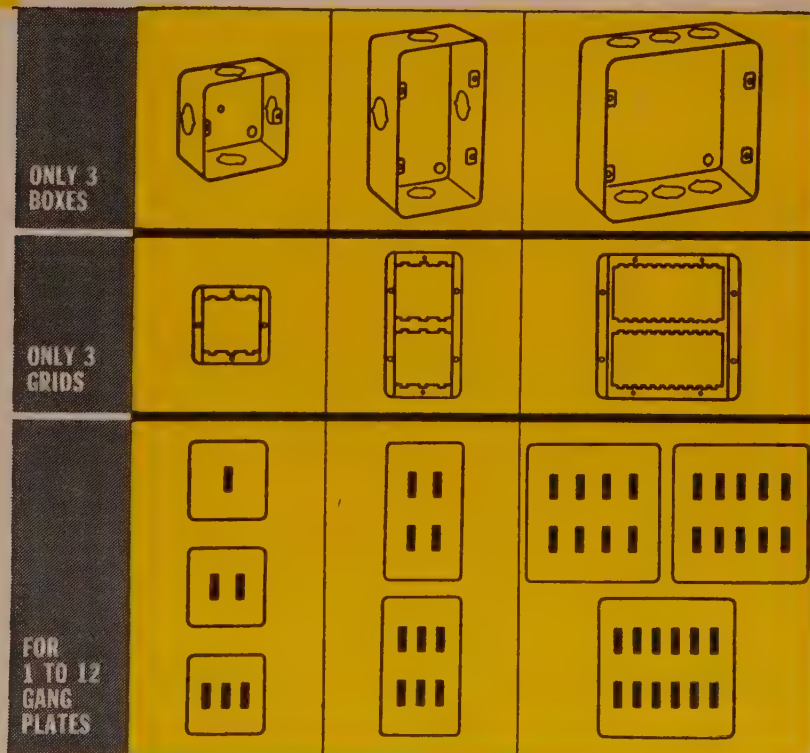
surface switches  
in steel boxes & covers



- \* 3 sizes of box.  
Deep drawn, Dual knockouts
- \* 3 grids
- \* 1 - 12 gang
- \* Maximum protection for switch dollies
- \* Boxes and covers finished aluminium stove enamel
- \* Prices to please you

### INTERCHANGEABLE ACCESSORIES

- 5 amp. 1-way S.P. switch
- 15 amp. 1-way S.P. switch
- 5 amp. 2-way S.P. switch
- 5 amp. double pole switch
- 5 amp. 2-way and off switch
- 5 amp. intermediate switch
- 5 amp. 1-way S.P. secret switch
- 5 amp. 2-way S.P. secret switch
- Mains voltage bell push
- Neon indicator



INSTALLATION EQUIPMENT GROUP

SWITCH AND FUSE GEAR  
H.R.C. FUSES  
OVERHEAD BUSBARS  
RISING MAINS  
CONDUIT  
PIRELLI GENERAL CABLE  
CABLE TRUNKING  
UNDER-FLOOR CABLE DUCTS  
ELECTRIC WIRING ACCESSORIES  
BELLS

THE GENERAL ELECTRIC CO. LTD., MAGNET HOUSE, KINGSWAY, LONDON, W.C.2  
INSTALLATION EQUIPMENT GROUP HEADQUARTERS, FOUR ASHES, WOLVERHAMPTON





**EAGER BEAVERS NOW**







## HAVE THREE PAIRS OF HANDS

The AEI Cable Division—the merger of Henley's, Liverpool Cables and Siemens Ediswan—now offers the famous Eager Beaver Service for a wide range of **wiring cables and flexible cords**.

The Eager Beaver Service is now multiplied by three. It represents the utmost in willingness and resourcefulness. Get acquainted with this Eager Beaver Service soon and see just how it can help you with your day-to-day wiring cable requirements.

### **AEI CABLE DIVISION**

**Associated Electrical Industries Limited**  
CABLE SALES DEPARTMENT

51/53 Hatton Garden • London EC1 • Telephone: CHAncery 6822







**21415**  
4-Pole Armoured Plug  
with adjustable rubber  
cord grip.

**RUGGED**  
WIRING ACCESSORIES

# Hubbellock

TRADE MARK

**ARMOURED COUPLERS  
PLUGS AND SOCKETS**

20 Amperes, 250 Volts D.C.

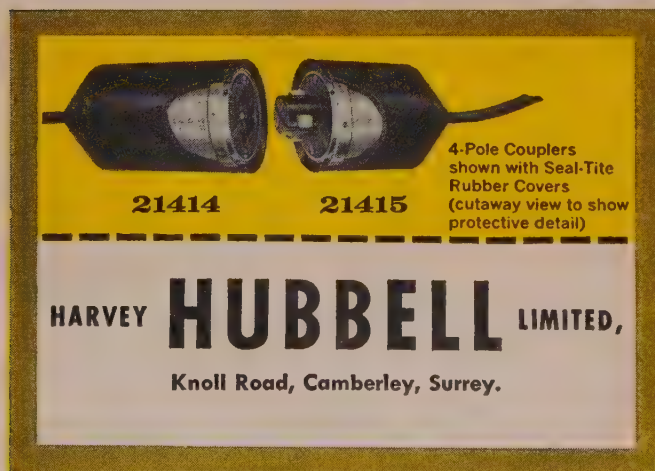
30 Amperes, 600 Volts A.C.

Designed for heavy duty service, "Hubbellock" accessories break the circuit and seal it in a split second.

The rugged contacts of the plug are machined from heavy brass stock and molded into special impact-resistant Bakelite supporting posts. These posts *absolutely* prevent the contacts from shifting out of alignment, bending, or twisting, no matter how rough the usage. The famous locking action (a

simple twist of the plug and it is locked) eliminates the necessity of threaded retaining rings.

A dead front safety shutter confines arcing *in the socket*, keeps out foreign matter and makes the socket safe from the human standpoint. For complete details about "Hubbellock" and other quality Hubbell wiring accessories, write or call Harvey Hubbell Limited, Knoll Road, Camberley, Surrey.



## CONTROL GEAR

A.C. and D.C.  
for all Industrial purposes

**STARTERS**  
DIRECT ON LINE  
PUSH BUTTON  
REVERSING  
STAR DELTA

REGULATORS  
RESISTANCES  
RELAYS  
CONTACTORS  
SWITCHES  
ETC.

A full range of Standard Equipment. Special Equipment designed and made to Customers' requirements.

VULCAN WORKS · 156-170 BERMONDSEY ST · LONDON · S.E.1

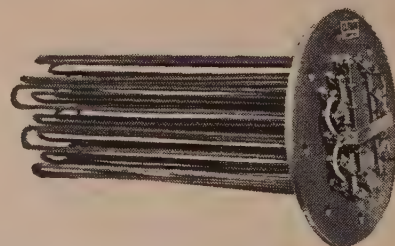
## HEATING ELEMENTS

FOR  
AIR  
OIL OR  
WATER

...

## ELTRON FOR ELEMENTS

...  
QUICK  
DELIVERIES  
...



SPECIAL ELEMENTS MADE TO CUSTOMERS' SPECIFICATIONS  
FOR INFRA-RED AND OVEN HEATING

**ELTRON (LONDON) LTD.**  
STRATHMORE ROAD, CROYDON

Telephone: Thornton Heath 1861





# hotfoil

FLAT-ELEMENT HEATING TAPES

## A revolutionary development in SURFACE HEATING

Hotfoil Flat-Element Heating Tapes introduce a new conception of heat transfer efficiency. Loadings more than twice those obtained with round-wire conductors are achieved through the use of metal foil elements insulated with high temperature plastic material and woven glass.

Hotfoil Tapes provide a most effective method of compensating for heat losses in pipe lines and raising temperatures in tanks or vessels containing almost any fluid. They can also be used for protecting steam and water pipes against frost.

Robust yet flexible, Hotfoil Tapes have an infinite variety of other applications in industry.

*Write today for illustrated technical brochure.*

THE M.E.I. CO. LTD - Cyprus Works - Upper Villiers St - Wolverhampton - Tel: 26354

A member of the Deritend Group of Companies

Please send a copy of Hotfoil technical brochure

NAME .....

ADDRESS .....

ME.I.I.

Smee's



# 'BOBY'

## DEMINERALISATION



Established in 1875

WILLIAM BOBY &amp; CO. LTD

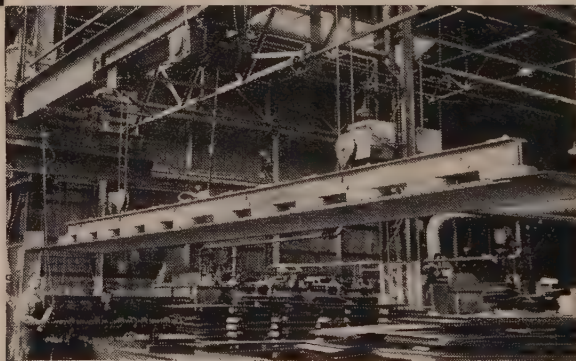
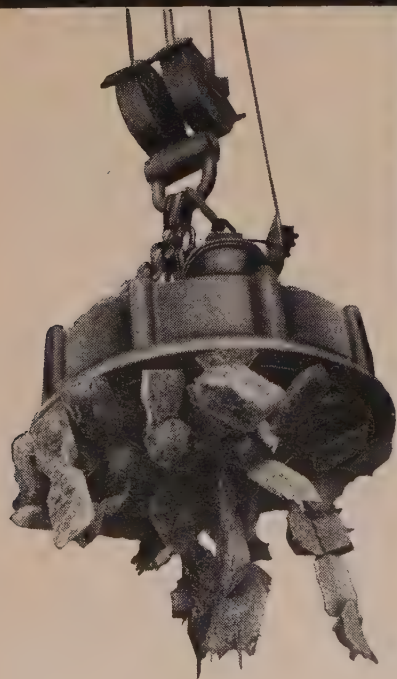
RICKMANSWORTH · HERTFORDSHIRE · ENGLAND · Telephone: Rickmansworth 6363

*Supplied to many of the leading  
Industrial Organisations and Corporations in  
Gt. Britain and Overseas, including*

Allen & Hanburys Limited  
Anjala Paper Mills, Finland  
Associated Ethyl Company Limited  
British Cellophane Limited  
Central Electricity Generating Board  
Chemstrand Limited  
Courtaulds Limited  
Enso-Gutzeit OY, Finland  
Fisons Limited  
A. H. Hunt (Capacitors) Limited  
Lastex Yarn & Lactron Thread Limited  
C. A. Parsons & Company Limited  
Pfizer Limited  
Seager, Evans & Company Limited  
The Burma Pharmaceutical Industry  
Tyne Chemical Company Limited  
Veitsiluoto OY, Finland

### Burnand

## Phoenix Lifting magnets



Photograph by courtesy of  
Rubery Owen & Co. Ltd.

Photograph by courtesy of  
Staveley Iron & Chemical Co.  
Ltd.

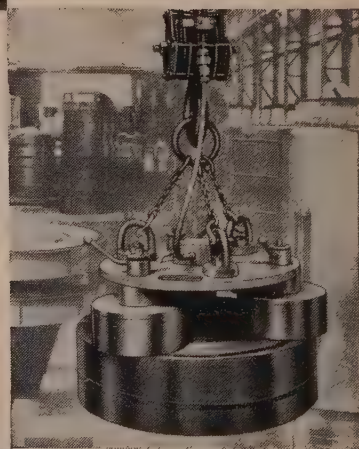


Magnets avail-  
able on hire for  
long or short  
term.

Photograph by  
courtesy of C.M.  
Supplies Ltd.

The Phoenix range  
includes circular, rect-  
angular and bi-polar  
magnets.

A competent design  
staff will be pleased to  
advise on special  
applications.



ALL MAKES OF LIFTING MAGNETS REPAIRED, REWOUND AND OVERHAULED

W. E. BURNAND & SON LTD. DUO WORKS, SHOREHAM STREET, SHEFFIELD.

Tel: 24148 (3 lines)



# IC processing equipment

# *Pumping*

The VACSEAL pump requires no sealing water, and has no gland problems. It pumps suspensions of coal and other abrasive liquids 24 hours a day without trouble. This is just one example of IC processing equipment designed to meet the needs of industries as varied as quarrying, cosmetics, agriculture, steel and plastics. If you have a processing problem, no matter what your industry — write to IC about it.

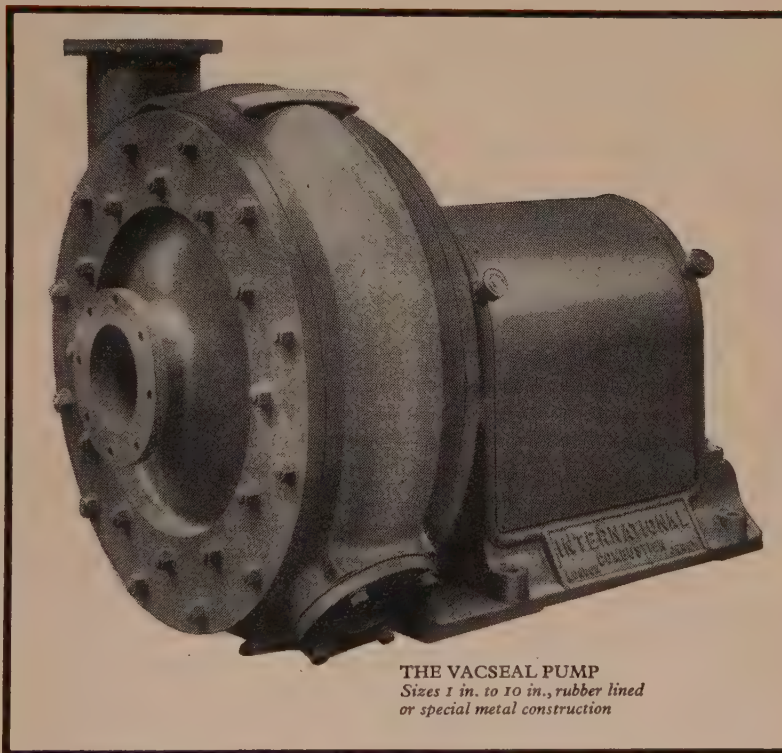
#### IC products also include —

'LOPULCO' MILLS for dust-free grinding of coal and many other materials.

'TY-ROCK' SCREENS, mechanical and full floating for high capacity screening.

LABORATORY EQUIPMENT for milling, separating, filtering, sieving and testing of samples.

MECHANICAL HANDLING equipment to suit Power Station and Industrial requirements.



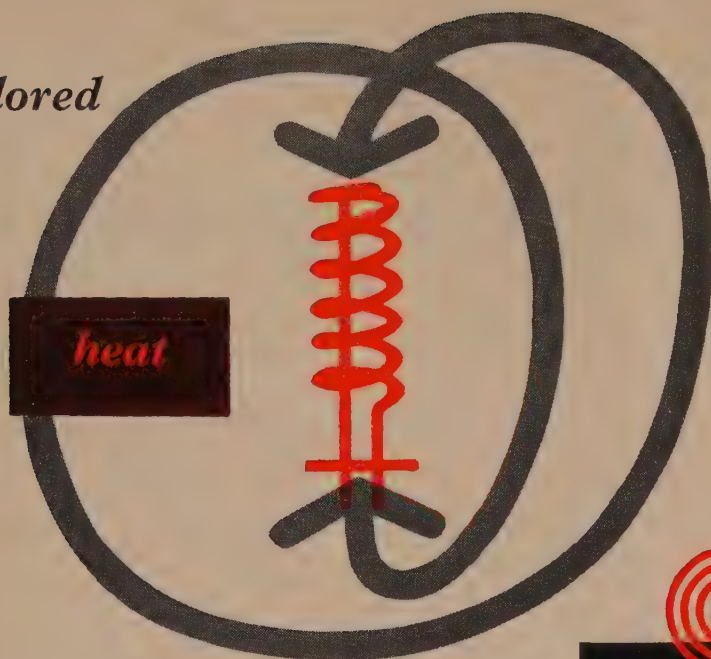
THE VACSEAL PUMP  
Sizes 1 in. to 10 in., rubber lined  
or special metal construction

# IC

## INTERNATIONAL COMBUSTION PRODUCTS LIMITED

NINETEEN WOBURN PLACE, LONDON WCI TELEPHONE: TERMINUS 2833 WORKS: DERBY  
'LOPULCO', 'TY-ROCK' and 'VACSEAL' are registered trade marks



*tailored**where you want it . . . . .**as you want it.*

Backer Tubular Sheathed Heating Elements are safe, efficient and controllable, at any temperature from 50°C. to 800°C.

Any power rating. Designed for you, or made to your specifications. Our experience is always at your disposal.

Europe's Leading Heating Element Specialists.



**THE BACKER ELECTRIC COMPANY LIMITED**  
**ROTHERHAM. YORKS.**

Telephone Rotherham 78181 (8 lines) Telex : 54161

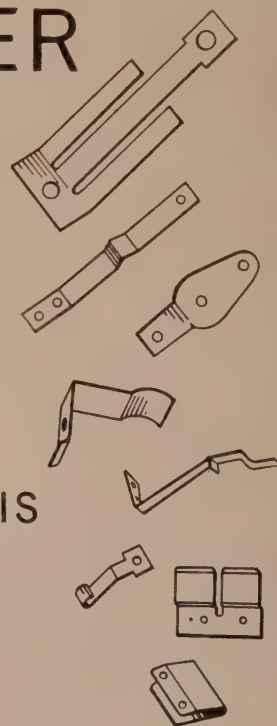
## BERYLLIUM COPPER IS BEST

for strip-formed piece parts of all kinds because it combines all the advantages of a copper-base alloy, such as easy formability and high electrical conductivity, with the high tensile strength, fatigue resistance and hardness usually associated with high grade steels. Beryllium Copper strip is generally fabricated into complicated shapes from annealed, quarter or half-hard rolled material prior to hardening to spring temper by simple heat treatment.

THE BEST BERYLLIUM COPPER IS

**TELCON**

*also available as Rod, Wire and Castings*



Sole Distributors in the U.K.

## BERYLLIUM AND COPPER ALLOYS LTD.

47, Victoria Street. London S.W.1. ABBEY 6421/2

15, Westfield Terrace. Sheffield 1. SHEF. 26650



# New Cable standards

## demand experience

Manufacturing wiring cables to the revised British Standard 2004 demands the kind of experience that BICC has gained in over sixty years of cabling. The reduced overall dimensions of the new type cables make it essential to maintain the correct thickness of dielectric and to place the conductors concentrically within it. This means employing the most stringent production control techniques. The production facilities of BICC—a group of factories equipped with the most up-to-date plant, staffed by specialist engineers—ensure that the cables are manufactured to the highest attainable quality.

BICC cables to the new standard include 'X' types (P.V.C. Insulated Only) Conduit Cables and 'Y' types (P.V.C. Insulated and Sheathed) Wiring System Cables and Flexible Cords. These cables—and many types of plastic cable—are available for immediate delivery from the 48 BICC Branches throughout the British Isles. For further details of cables to B.S. 2004: 1961, write for Publication 439.

**BICC**

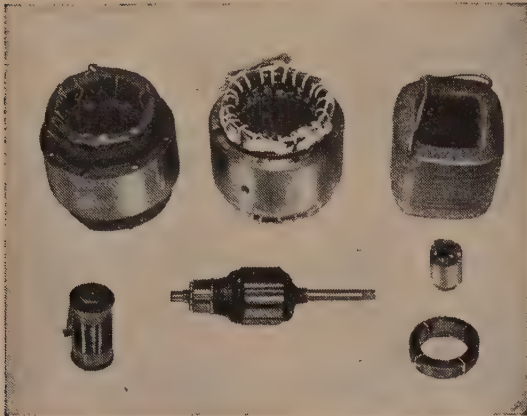
the World's largest cabling makers

BRITISH INSULATED CALLENDER'S CABLES LIMITED • 21 Bloomsbury Street, London, W.C.1



## Have you any winding problems?

Coils supplied from  $\frac{1}{2}$  in. to 6 ft. in diameter



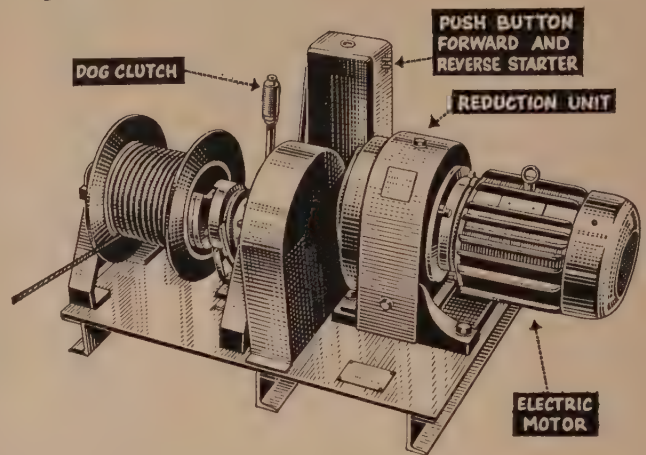
Capacity available for contract winding of—  
COILS • CHOKES • TRANSFORMERS  
ARMATURES AND STATORS

**SIMMONS** ELECTRICAL AND WINDING CO. LTD.  
Simpsons Road, Bromley, Kent

Manufacturers of Special Electric Motors,  
Generators, Machinery and Control Gear  
ON H.M. GOVERNMENT LISTS

Telephone:  
Ravensbourne  
5906

## Thompson ELECTRIC WINCHES



The 3-ton pull Electric Winch with a rope speed of 30ft. per minute shown above is just one of many electrically powered winches which we have designed specially to meet the particular needs of a customer. Let us advise you on your hauling problem.

Sole Manufacturers :

**THOMPSON BROS. (ENGINEERS) LTD.**  
ARCHERY WORKS . ARCHERY ROAD . S.E.9 . LONDON . ENGLAND  
Telephone : ELTham 5522-3      Telegrams : PROFICIENT, ELT, LONDON

## DISTRIBUTION & POWER TRANSFORMERS & CHOKES Insist on T.E.C.



**AIR & OIL COOLED TYPES**  
Good Deliveries  
Clean Design & Finish  
Competitive Prices.

**The TRANSFORMER & ELECTRICAL CO. LTD**  
MANUFACTURERS OF POWER TRANSFORMERS UP TO 100 KVA etc.  
**HONYWOOD RD., BASILDON, ESSEX.**  
C.S.A. Approved - Catalogue on Request - Contractors to H.M. Government  
TELEPHONE: BASILDON 20491-3



## WALL BRACKETS



**TMB/161**

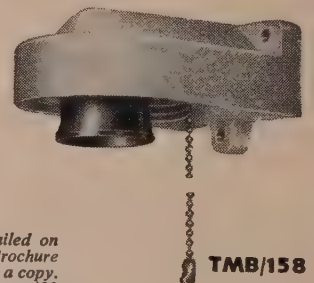
We offer you a wide selection of artistic plastic wall brackets designed to meet fully the present-day requirements for home furnishing and for commercial premises.

TMB/161. This E.S. Type is available either with or without pull switch and can also be supplied for exposed lamp.

TMB/158. This B.C. type takes a standard shade with  $1\frac{1}{8}$ " hole. It can be supplied with or without pull switch and also for inverted lamp to face upwards.

The above types can be supplied in BROWN. Both types available BC and ES.

Further types of wall brackets are detailed on page 20 of our 34 page illustrated Brochure 1453/ER and you are invited to apply for a copy. The Brochure also gives information of over 400 Tunion products.



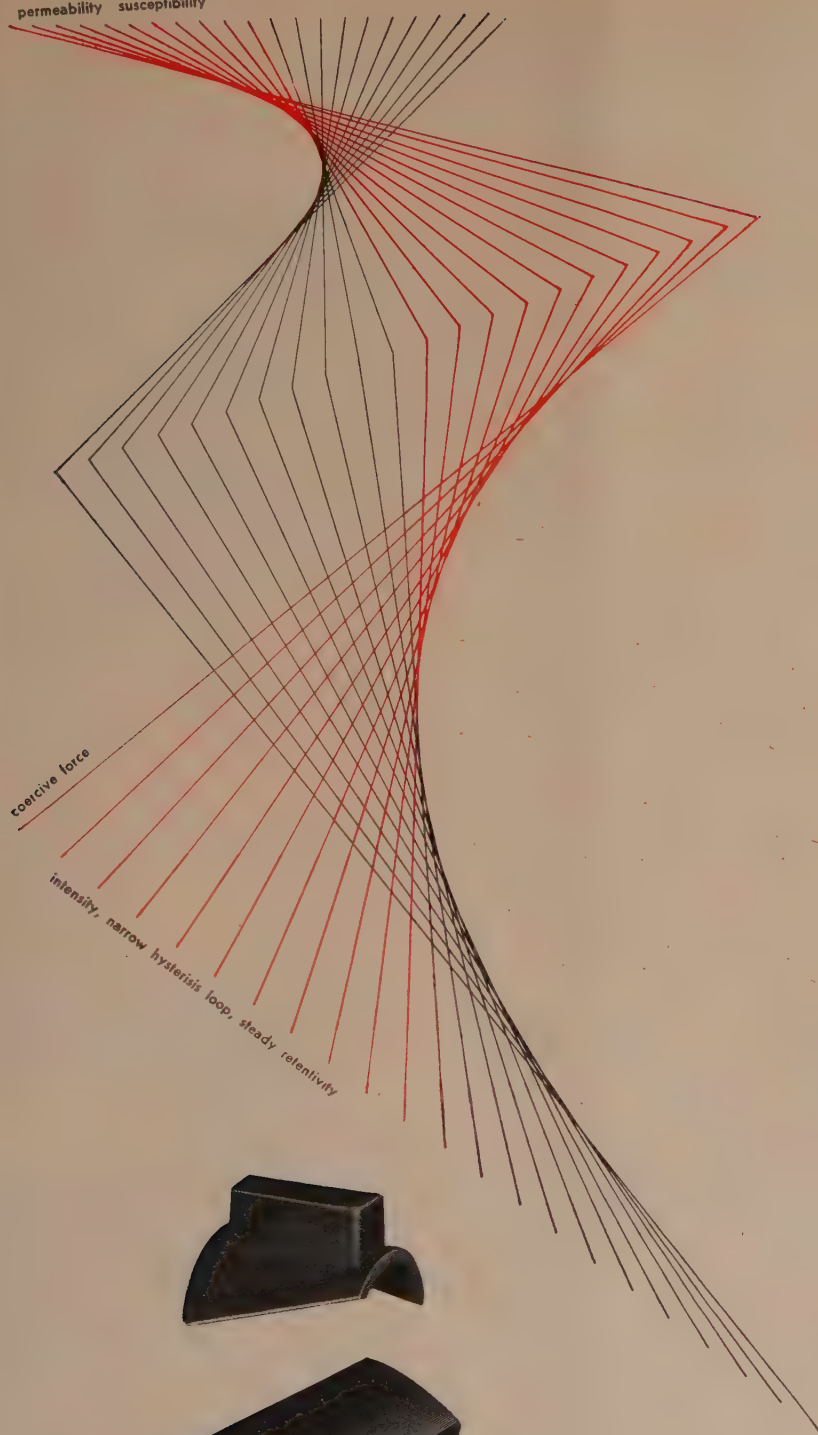
**TMB/158**

## GEORGE TURNOCK LTD

Tunion Works, Navigation Street, WALSALL, Staffs  
Telephone: Walsall 4966



permeability susceptibility



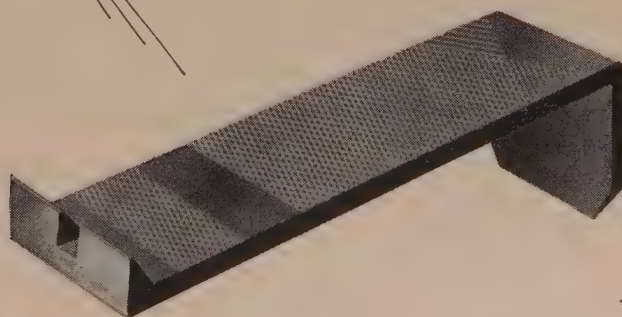
## SUPERB REMANENCE and COERCIVE FORCE

... plus triple refining under rigidly controlled conditions and superior permeability for all magnetic and electrical purposes. These are the qualities by Low Moor which enable electrical engineers to specify SUPER HIPERM with every confidence.

Available as Ingots, Billets, Slabs, Plates, Regular Bars and Special Forms.

Application details, together with Magnetisation Curve, are available on request.

## SUPER HIPERM



**LOW MOOR**  
ALLOY STEELWORKS LIMITED

LOW MOOR, BRADFORD

For SUPER HIPERM and Alloy and Special Steels:  
Low Moor Alloy Steelworks Ltd.

For Extrusions: Low Moor Fine Steels Ltd.

Telephone: 77331 (9 lines)

Printed in Great Britain



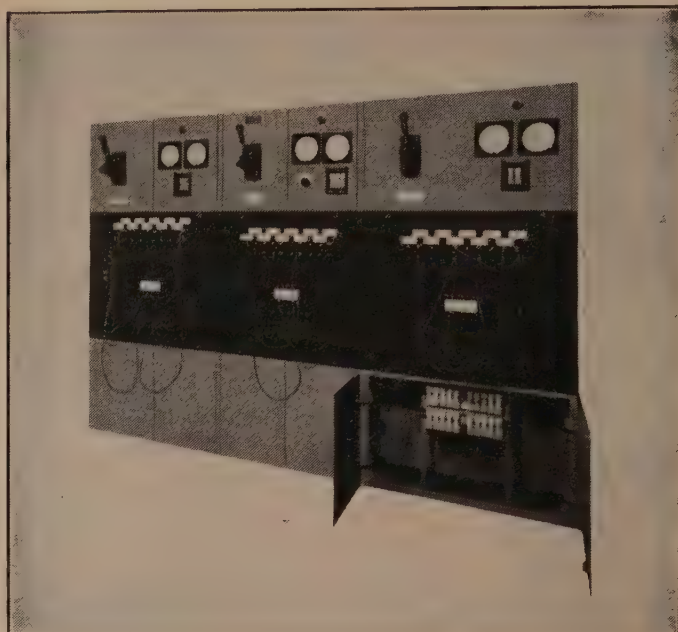
# Laboratory Switchboards

## for

## Technical Colleges

Switchboards of the type illustrated have been developed for use in large technical colleges and similar establishments where it is necessary to provide a variety of power supplies for the wide range of experimental work carried out in the electrical departments. This particular board caters for single and three phase A.C. and two/three wire D.C. at various voltages. Flexible leads plugged into the face of the switchboard enable any supply to be fed to any required bench or machine.

The Company invites enquiries for further information about this equipment and will gladly arrange for a technical representative to discuss details with any interested person.



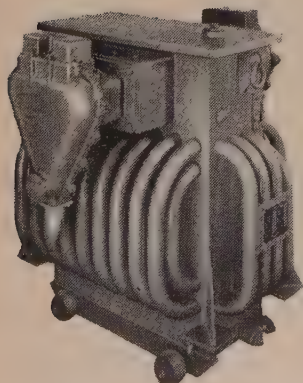
**THE NEW SWITCHGEAR CONSTRUCTION CO. LTD.**

WELLESLEY ROAD SUTTON SURREY • TELEPHONE: VIGILANT 8234

*Associated with Hackbridge & Hewitt Electric Co. Ltd.*

# 'Stewart'

## TRANSFORMERS



Suitable for any  
Equipment where  
loadings up to  
**250 KVA** (double wound)  
are required

VOLTAGES UP TO 66 KV

CURRENT UP TO 2500 amp.

For . . .  
ELECTRO-PLATING  
RECTIFIER EQUIPMENT  
FURNACES—  
EVERY INDUSTRIAL  
APPLICATION

*Illustration shows a 50 KVA 3 Phase distribution transformer, outdoor type. Voltage ratio 6,600/440 volt.*

**STEWART TRANSFORMERS LTD.**

Kilburn Lane, London, W.10 Tel: LADbroke 2296/7

# The Only One

OF ITS KIND....

The Patent Serrated Anchor Rivet Bush is the best means of providing deep tapped holes in thin sheet metal.

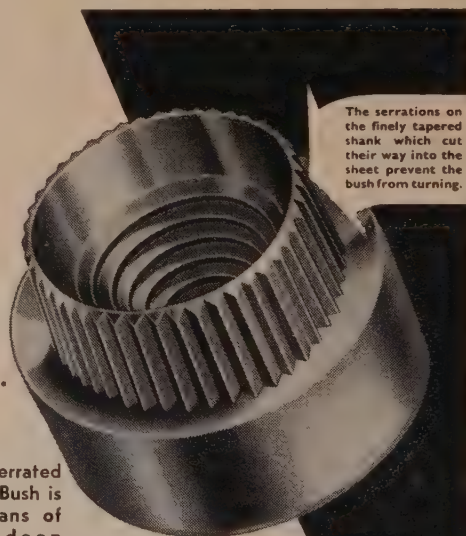
**"PRECISION"**  
PATENT SERRATED

# ANCHOR RIVET BUSH

THE PRECISION SCREW & MFG. CO. LTD.

UNION ST. WILLENHALL STAFFS.

PHONE: WILLENHALL 621



The serrations on the finely tapered shank which cut their way into the sheet prevent the bush from turning.

*write for  
leaflet 220*



# "HIDUTAC"

## switchfuses for



now available  
from stock

15, 30 or 60 amp. 440 volt a.c. Single Pole and Neutral,  
Double Pole, Triple Pole, Triple Pole and Neutral  
Switchfuses with interchangeable H.R.C. or rewirable fuses.

**G.E.C.**

**INSTALLATION EQUIPMENT GROUP**  
SWITCH AND FUSE GEAR • H.R.C. FUSES • OVERHEAD BUSBARS • RISING  
MAINS • CONDUIT • PIRELLI GENERAL CABLE • CABLE TRUNKING  
UNDER FLOOR CABLE DUCTS • ELECTRIC WIRING ACCESSORIES • BELLS

THE GENERAL ELECTRIC CO. LTD., KINGSWAY, LONDON, W.C.2  
INSTALLATION EQUIPMENT GROUP HEADQUARTERS, FOUR ASHES, WOLVERHAMPTON



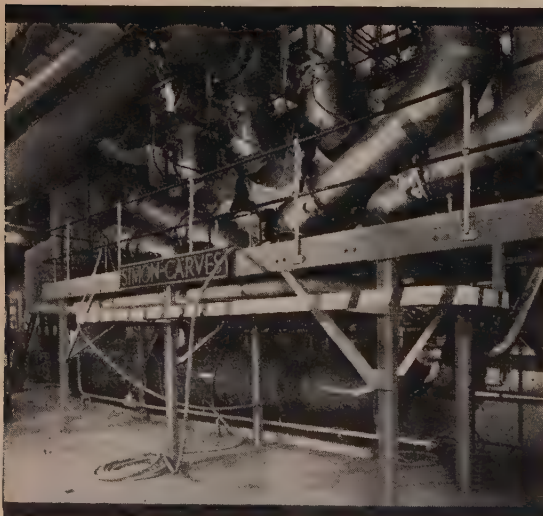
# *"Remarkable"* SAID THE MINISTER



So said Mr. Richard Wood, the Minister of Power, at the inauguration of Britain's first once-through supercritical forced-circulation boiler. Designed and built by Simon-Carves at the Margam works of the Steel Company of Wales, it marks a major advance in large-scale steam generating practice.

The steam conditions of 3300 p.s.i. and 1060°F are the highest yet commercially used in Great Britain. The associated back-pressure turbo-alternator gives an output of 9500 KW (approximately 30% increased on the installed capacity of the existing generation plant). Process steam is exhausted at 650 p.s.i.g. and reheated to 820°F to serve the new turbo-blowers and the existing system.

Whether generating steam at pressures above or below the critical pressure, the O T boiler has many advantages over conventional natural and assisted circulation boilers. These are explained in the brochure 'OT Forced-Circulation Boilers by Simon-Carves Ltd'.



*left.* The operating front of the boiler is housed in the turbine building. Fuel can be blast furnace gas or fuel oil or a mixture of both.

*right.* The central control panel. From here, both the boiler and the high pressure turbines are controlled.



O T FORCED-CIRCULATION BOILERS BY

## *Simon-Carves Ltd*



MEMBER COMPANY SIMON ENGINEERING LTD

CHEADLE HEATH, STOCKPORT • AND AT CALCUTTA • JOHANNESBURG • SYDNEY • TORONTO



*Aerialite*

AERIALITE MANUFACTURE a complete range of cables and flexibles in rubber and PVC, for Lighting, Heating, Power and Communication Installations. They are manufactured in strict accordance with British Standards Specifications including B.S.7:1953, B.S.1557:1954 and B.S.2004:1961. Catalogues available on request.

**FOR THE COMPLETE  
ELECTRICAL INSTALLATION  
SPECIFY**

**A** *erialite*

**CABLES AND FLEXIBLES**

*... for Dependability*

Head Office and Cable Division: Castle Works, Stalybridge, Cheshire. Phone 274, 275

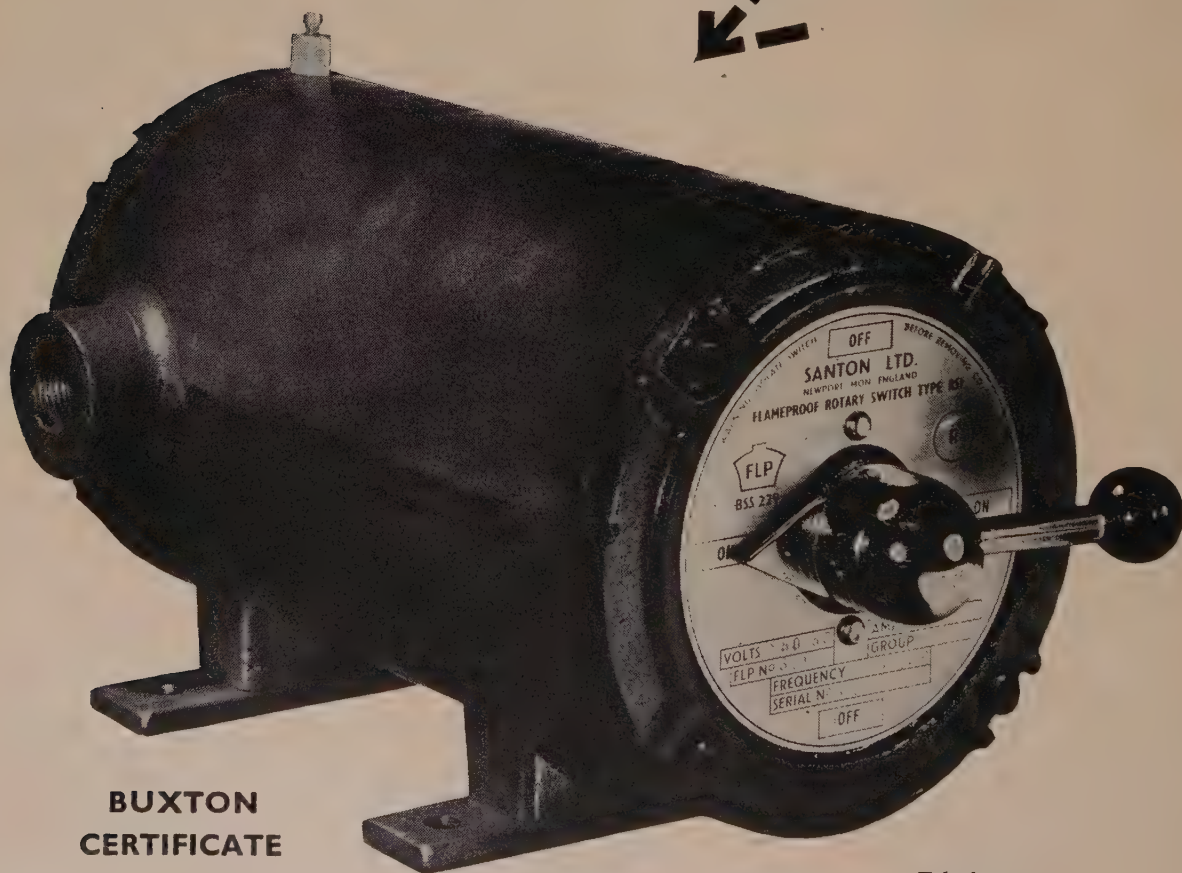


# The new



## FLAMEPROOF ROTARY SWITCH

Material Cast Iron.  
Rotary Switch 4 position A.C. or D.C.  
Max. Current Rating, 15 amps.  
Max. Voltage Rating, 600 volts.  
This Flameproof Rotary Switch is suitable  
for groups I, II, and III, to B.S.229.  
Flameproof number 3994 for group I, and  
3995 for groups II, and III.



**BUXTON  
CERTIFICATE**

Write now for full details

**SANTON LTD • NEWPORT • MON**

**Telephones:**

Newport 71711  
Manchester LONGford 4226/7  
London SHEpherds Bush 3311/2  
Birmingham PRIory 3924/4333  
Newton Abbot 2700/1  
Leeds 28762





Pressure Castings in zinc to 6 lb.  
Pressure Castings in aluminium alloy to 1 lb.  
Gravity Castings in both alloys

# TODAY THIS YEAR NEXT YEAR

Castings produced by this Company receive the same scrupulous care and fine finish which have made the Company's other products synonymous with high quality throughout the world.

## RAWLINGS IS THE NAME TO REMEMBER

**RAWLINGS MANUFACTURING CO LTD**

106/108 BEDFORD HILL · LONDON · S.W.12

TELEPHONE : BALHAM 3311

*for*  
**Electrical  
Insulation**

**VULCANISED  
FIBRE**

**LEATHEROID**

**EBONITE**

**BAKELITE**  
(Fabric & Paper Base)

**of every type**

The largest and most comprehensive range of insulating materials in the country.  
Supplied in sheet, rod and tube form.

ASBESTOS,  
CELLULOSE ACETATE,  
CASEIN,  
CAST RESIN,  
CHATTERTONS COMPOUND  
VARNISHED CLOTH, Tapes & Sleeveings,  
GLASS CLOTH, Tapes & Sleeveings,  
MICA & MICANITE,  
MOULDINGS,  
NYLON,  
P.T.F.E. & P.V.C.  
PLASTICS OF ALL TYPES,  
PRESSPAHN  
SLEEVEINGS,  
TAPES  
VULCANITE

*Also  
Turned and  
Pressed  
Parts*

**HEAVEN, DOWSETT  
& Co Ltd**

INSULATION HOUSE, 315 WELLINGTON ROAD  
BIRMINGHAM 20  
Phone: BIRchfield 6218-9 Grams: Fibre, B'ham 20

Please write or 'phone if further details or samples are required

# WIRAX<sup>REGD</sup>

**WIRE GUARDS**

MADE IN BULK TO YOUR REQUIREMENTS—  
TO BRITISH STANDARD SPECIFICATION

**WIRAX WIREWARES LTD**

BALSALL HEATH WIRE WORKS  
WENMAN STREET  
BIRMINGHAM · 12

CALthorpe 1733  
CALthorpe 4546





## Speed your cargo from here to there by **ROADAIR!**

**T**HE COMBINATION of road and air transport, running to regular schedules, offers you speedy and reliable services between reception points throughout Great Britain and the Continent.

Consignments of large indivisible loads or small parcels are carried with the minimum of handling at extremely economical rates which include all loading & unloading charges at Lydd (Ferryfield) and Le Touquet airports.

ASK YOUR  
FORWARDING AGENTS  
FOR FULL DETAILS.

Roadair services operate  
between  
LONDON  
and

PARIS	ANTWERP
LILLE	BRUSSELS
CALAIS	COURTRAI
CHERBOURG	OSTEND
ROUBAIX	GHENT
LE TOUQUET	AMSTERDAM
TOURCOING	EINDHOVEN
JERSEY	ROTTERDAM
GUERNSEY	TILBURG

With connecting services  
to and from  
Manchester, Leicester,  
Nottingham and Brighton



## SILVER CITY **ROADAIR** CARGO SERVICE

ROADAIR SERVICES ARE OPERATED  
BY SILVER CITY AIRWAYS LIMITED



### \* SAFEGUARDS EARTH CONTINUITY

Incorporates a Copper Bonding Link as an integral part of the connecting sleeve

## CABLEFLOW LTD.

- \* THE COPPER BONDING LINK IS  $\frac{1}{2}'' \times \frac{1}{4}''$  IN CROSS SECTION AND CAN BE ADAPTED TO TAKE A SCREW TERMINAL FOR AN EXTRA EARTH WIRE IF REQUIRED
- \* EXTRA SLOTS ARE PROVIDED IN THE TRUNKING BODY TO FACILITATE LID FIXING SHOULD THE TRUNKING NEED CUTTING
- \* ACCESSORIES ARE DESIGNED WITH RADIUS SURFACES TO PREVENT CABLES BEING DAMAGED BY SHARP ANGULAR EDGES
- \* DETACHABLE CABLE RETAINING STRAPS
- \* ALL NUTS AND BOLTS ARE CADMIUM OR ZINC PLATED
- \* ALL COMPONENTS OF THE SYSTEM ARE FINISHED IN OVEN-BAKED ENAMEL (ADMIRALTY GREY)
- \* CABLEFLOW TRUNKING IS SUPPLIED IN 6FT. LENGTHS FOR EASY HANDLING
- \* ALL CONNECTING SLEEVES ARE INTERNALLY FITTED TO GIVE A SMOOTH EXTERNAL APPEARANCE

ALSO AVAILABLE—CABLEFLOW SKIRTING TRUNKING TO YOUR SPECIFICATIONS EMBODYING SWITCH PANELS, PLUGS, ETC. PRICES UPON APPLICATION

PRICES GIVEN ON REQUEST FOR SPECIAL ACCESSORIES, NON-STANDARD CROSS SECTIONS, PIN RACKS, EXTRA LONG CONNECTING SLEEVES AND PARTITIONING FILLETS, BUS BAR CHAMBERS.

SEND THIS COUPON FOR FULL DETAILS AND PRICES TO:—  
CABLEFLOW LTD., FACTORY UNIT 4A FIRCREFT WAY,  
EDENBRIDGE, KENT.

NAME \_\_\_\_\_  
ADDRESS \_\_\_\_\_



# Cable Racks & Hangers



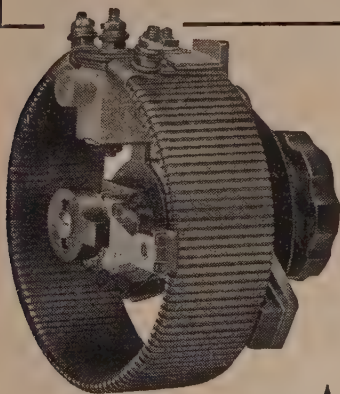
SEND FOR  
LIST OF  
STANDARDISED  
SIZES



E.D.L. INDUSTRIES LTD., Redbrook Lane, Brereton, Rugeley, Staffs  
Telephone: Rugeley 711

*a range of extremely robust*

## ROTARY RHEOSTATS



Open or enclosed types  
100 watts  
150 watts  
200 watts  
Larger sizes quoted on  
request

An extremely robust  
rheostat with a unique  
metal cored former  
(patent appd. for)

*Full details from the  
manufacturers*

The **CURTIS** Manufacturing  
Company  
Limited  
26-28 PADDENSWICK ROAD  
HAMMERSMITH, W.6  
Telephone: RIV. 4456 and 4583



## SPHERICAL KNOBS

A wide range of sizes with  
male or female threads  
for the Electrical and  
Engineering Industries  
Full range of colours

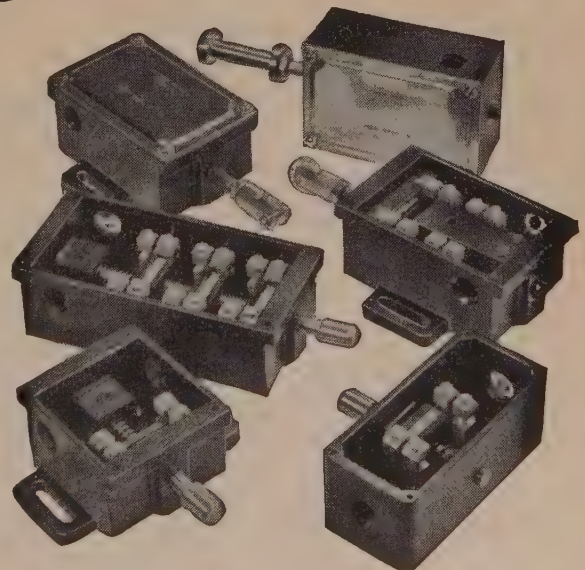


*Litholite*  
Plastic Moulders  
since 1901

LITHOLITE Insulators & St. Albans MOULDINGS LTD.  
Sandown Road, WATFORD, Herts. Tel. WATFORD 23377

## "Colne"

HEAVY DUTY  
LIMIT SWITCHES



Manufactured by  
**ASQUITH ELECTRICS (Colne) LTD.**  
*formerly Colne Switchgear (K. & W.) Ltd.*  
Walton Street, Colne, Lancs.  
Telephone: Colne 1394/5



## Final Clearance of ELECTRICAL PLANT at ROTA SPAIN

Two—12.5 h.p. vertical single cylinder air cooled DIESEL ENGINES by *Deutz*, Model A1L514, dated 1956, speed 1,500 r.p.m.

27.5 KVA 400/440 volts 3 phase 50 cycles 4-wire Petrol Engine driven Alternator Set, comprising: ENGINE by *Meadows*, type 4ELAV. Direct coupled to: ALTERNATOR by *General Electric Co.*

ONE—45 kVA 400/440 volts 3 phase 50 cycles 4-wire Diesel Engine driven Alternator Set, comprising:

ENGINE by *Chrysler*, vertical 6 cylinder radiator fan cooled 4 stroke cycle. Arranged for electric starting. Direct coupled to: ALTERNATOR by *Alpha Harris*.

A.C. Motor driven Pumping Set, on baseplate comprising: CENTRIFUGAL PUMP by *Pulsometer*, type VB.4, central end suction 5 in. diameter, vertical discharge 4 in. diameter, stainless steel impeller. Direct coupled to:

MOTOR by *Alpha Harris*, 20 h.p. squirrel cage type, wound for 400 volts 3 phase 50 cycles supply, and control gear.

150 h.p. AUTO SYNCHRONOUS MOTOR by *Crompton Parkinson*, wound for 400/440 volts 3 phase 50 cycles supply, speed 600 r.p.m., flanged mounted exciter, with CONTROL GEAR.

112 h.p. SLIPRING INDUCTION MOTOR by *Brush Electrical*, wound for 400/440 volts 3 phase 50 cycles supply, speed 980 r.p.m., with combined stator rotor starter.

100 h.p. SLIPRING INDUCTION MOTORS by *Lancashire Dynamo Co.*, wound for 400/440 volts 3 phase 50 cycles, speed 730 r.p.m.

30 h.p. SLIPRING MOTOR by *Crompton Parkinson*, wound for 400 volts 3 phase 50 cycles supply, speed 950 r.p.m., with stator rotor starter.

100 kVA oil immersed naturally cooled AUTO TRANSFORMER by *Metropolitan Vickers*, 400/200 volts 3 phase 50 cycles supply.

Two—30 kVA oil cooled AUTO TRANSFORMERS by *Electric Construction Co.*, 400/230 volts 3 phase 50 cycles.

100 h.p. SLIPRING INDUCTION MOTOR *Constr. Nacional de Maquinaria Electrica (Spain)*, wound for 440 volts 3 phase 50 cycles supply 750 r.p.m., double shaft extension.

Two—75 h.p. SLIPRING MOTORS by *Constr. Nacional de Maquinaria Electrica (Spain)*, wound for 440 volts 3 phase 50 cycles, speed 730 r.p.m.

30 h.p. SLIPRING MOTOR by *Crompton Parkinson*, wound for 400 volts 3 phase 50 cycles supply speed 950 r.p.m., with stator rotor s.arter.

500 kVA oil cooled TRANSFORMER by *General Electric (Spain)*.

350 kVA oil immersed naturally cooled TRANSFORMER by *Eguren (Spain)*.

Three—250 kVA naturally cooled TRANSFORMERS by *General Electric (Spain)*.

Two—30 kVA naturally cooled TRANSFORMERS by *General Electric (Spain)*.

Two—180 kVA oil immersed naturally cooled TRANSFORMERS by *Eguren (Spain)*, primary 3160 volts, secondary 225/135 volts 3 phase 50 cycles, connection delta star.

**GEORGE COHEN**  
SONS. AND COMPANY LIMITED  
WOOD LANE, LONDON, W.12

Telephone: Shepherds Bush 2070

Grams: OMNIPLANT, TELEX, LONDON

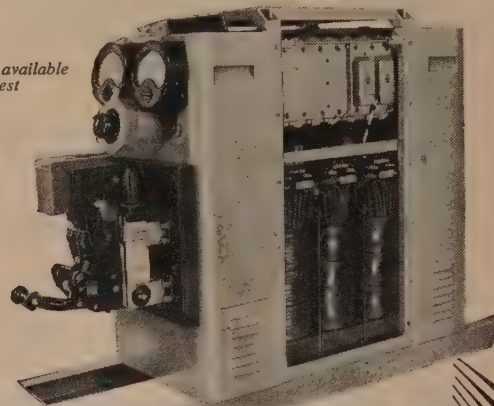


## SELENIUM & SILICON RECTIFIERS

FOR DC  
POWER  
SUPPLIES

Illustrated is a 30 V. 2,000 amp. air cooled rectifier with Remote Control which has a range of 200/2,000 amps. Units of this order can be supplied as straight Transformer Rectifiers or with Magnetic Amplifier Control giving smooth D.C. Control outputs over a wide range. Air Blast or Oil Filled can be supplied depending upon the application and use.

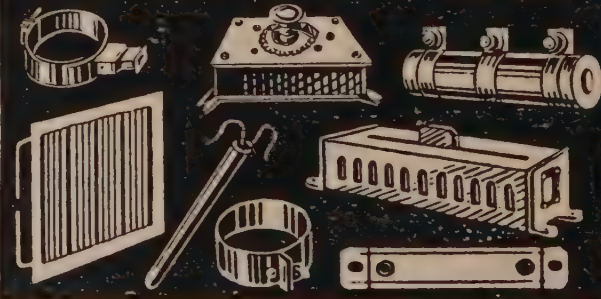
Leaflet available  
on request



**HIRST ELECTRONIC LTD.**  
GATWICK ROAD, CRAWLEY, SUSSEX

## INDUSTRIAL HEATERS METWAY AND RESISTANCES

PRODUCTS  
REGISTERED TRADE MARK



For full details ask for Catalogue No. JYL/30/ER

**METWAY - KEMP TOWN - BRIGHTON**



We ARE THE SPECIALISTS IN  
MINIATURE CIRCUIT BREAKERS

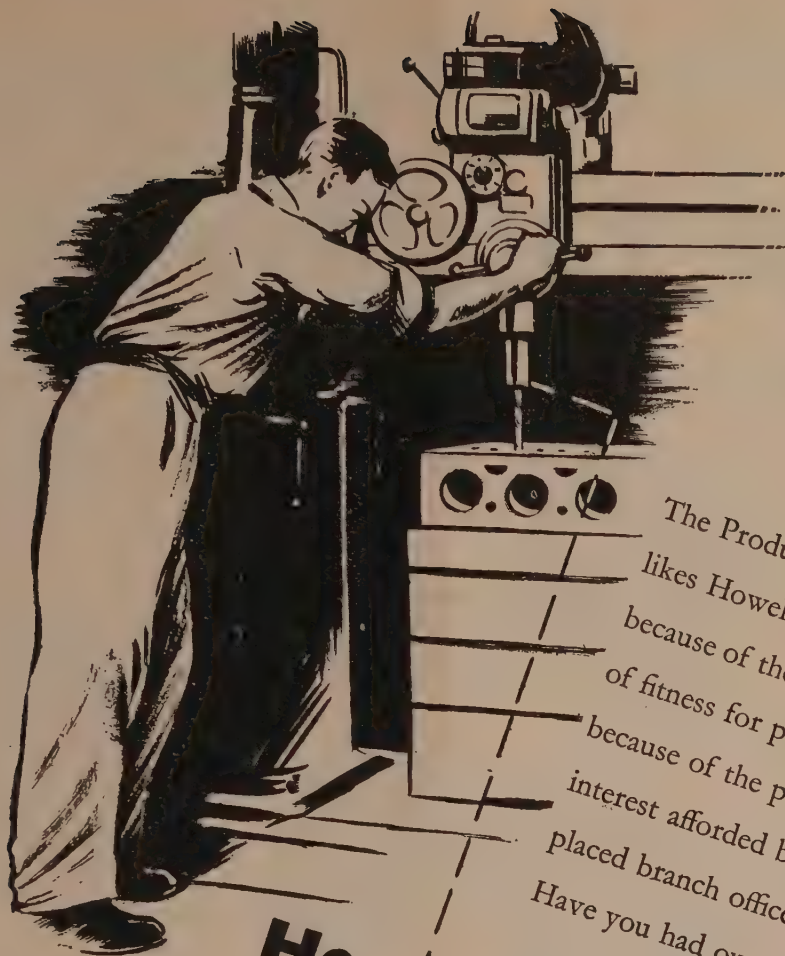
The  
**M.C.B. CO. (MANCHESTER) LTD.**  
makers of



**MINIATURE CIRCUIT-BREAKERS**

Lupus Works, Oxford Road, Altrincham, Cheshire  
Tel: ALTRINCHAM 2722/3



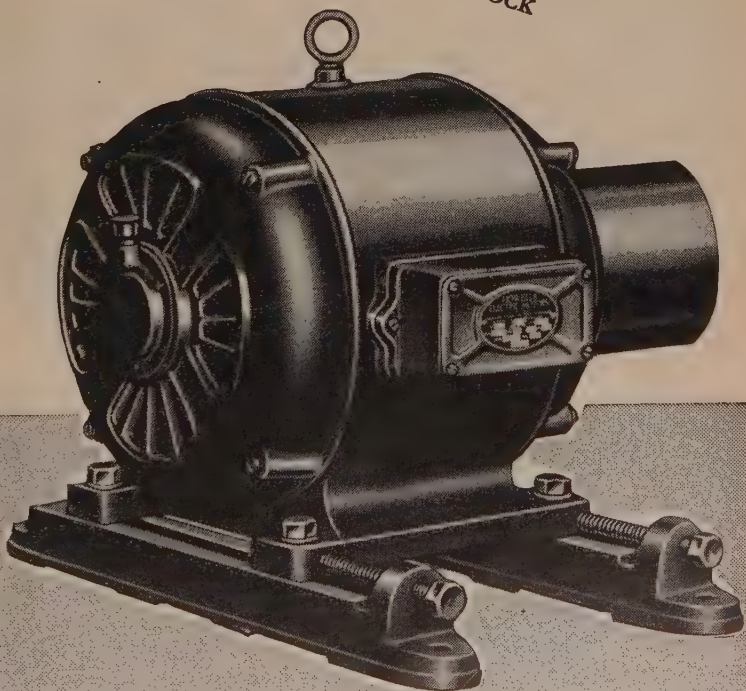


The Production Engineer likes Howells motors firstly, because of their intrinsic qualities of fitness for purpose and secondly, because of the personal service and interest afforded by six strategically placed branch offices.

Have you had our latest lists?

DELIVERIES, MOST SIZES, FROM STOCK

He depends on Power by



# HOWELLS

(ELECTRIC MOTORS) LTD  
HANLEY · STOKE-ON-TRENT

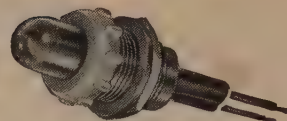
Branches at:  
LONDON · MANCHESTER · BRISTOL  
BIRMINGHAM · GLASGOW · LEEDS



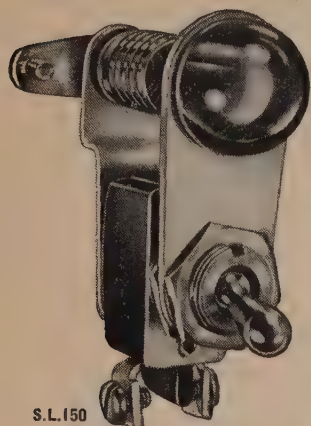
# Arcoelectric Signal Lamps



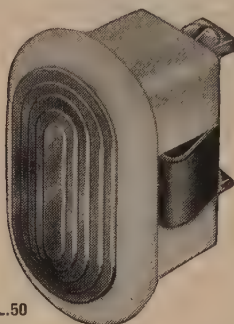
S.L.162



S.L.160



S.L.150



S.L.50



S.L.130

## Neon for 80—600 volts

**S.L. 162 and S.L.160:**

New miniature low cost neon signal lamps.  $\frac{1}{8}$ " hole fixing. Completely sealed against moisture.

**S.L.50:** Snap-in fixing.

## Low Voltage

**S.L.130:** New high quality design for M.B.C. (M.C.C.) bulbs. Also available with M.B.C. neon.

**S.L.90/SB:** Popular M.E.S. holder. Services No. 10AE/413.

**S.L.135:** Adjustable M.E.S. holder.

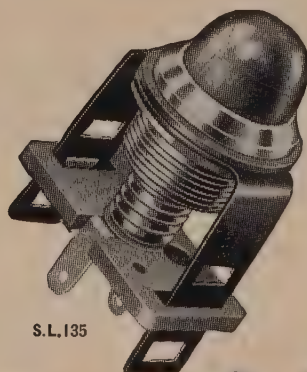
**S.L.150:** Combined toggle switch and M.E.S. signal lamp.

**S.L.82:** M.E.S. holder ZA 4201.

**S.L.86:** Low cost M.E.S. holder.



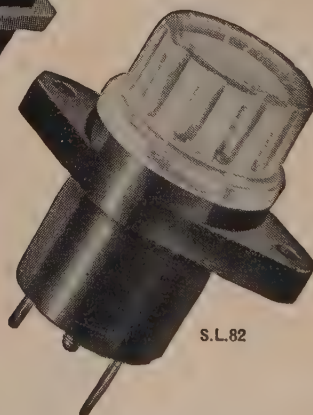
S.L.86



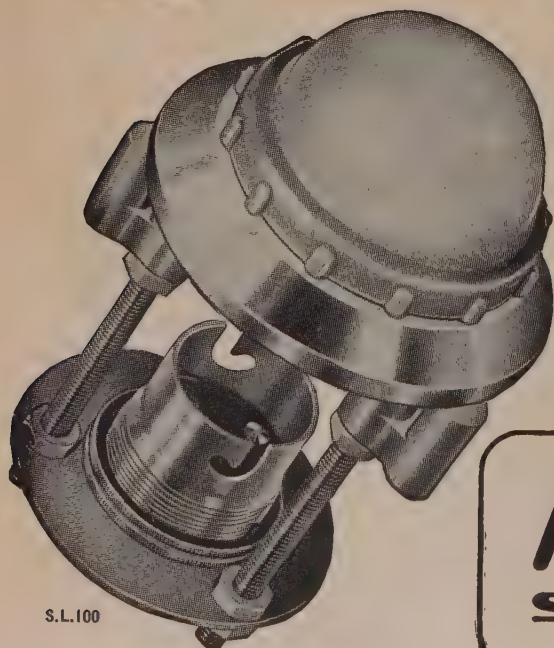
S.L.135



S.L.90/SB



S.L.82



S.L.100

## Mains

**S.L.100:** For 15 watt B.C. sign lamps.

A similar but smaller S.B.C. holder is available for S.B.C. 10 watt lamps.

**Write for Catalogue No. 132**

**ARCOELECTRIC**  
SWITCHES • LTD



Industry is going over to these Nylon Bushings in a big way

they're



## NYLON STRAIN RELIEF BUSHINGS

(FULLY PATENTED)

Since their introduction to Britain from the U.S.A. I.M. NYLON STRAIN RELIEF BUSHINGS are being used by an ever-increasing variety of trades—Clocks, Radios, T/V., Fans, Toasters, Mixers, Vacuum Cleaners, Washing Machines, Portable Tools, Air Conditioners, Electric Mowers, Clippers, Drills, Saws, etc. They are rapidly becoming "Standard" where a positive, insulating, non-slip grip is essential. Made from Nylon, they grip tightly without nipping and give a streamlined appearance to the job.

*Some typical applications of I.M. Nylon Bushings*



*Easily applied—place Bushing on wire, push into hole—that's all!*

May we send you samples and technical leaflet?



Approved by American, Canadian, Norwegian, Standards Associations

## INJECTION MOULDERS LTD.

KINGSBURY · LONDON NW9

Telephone: COLindale 0141 (4 Lines)

1M/75

THE EQUIPMENT WITH SO MANY PRACTICAL APPLICATIONS

# MARTINDALE BLOWER!

### ★ FOR POWERFUL BLOWING

Its strong blast of dust-removing air can be directed into every inaccessible crevice

### ★ FOR SUCTION CLEANING

When used with the standard vacuum attachments the Blower instantly sucks up all dirt and dust.

### ★ BINTOOL CLEANING

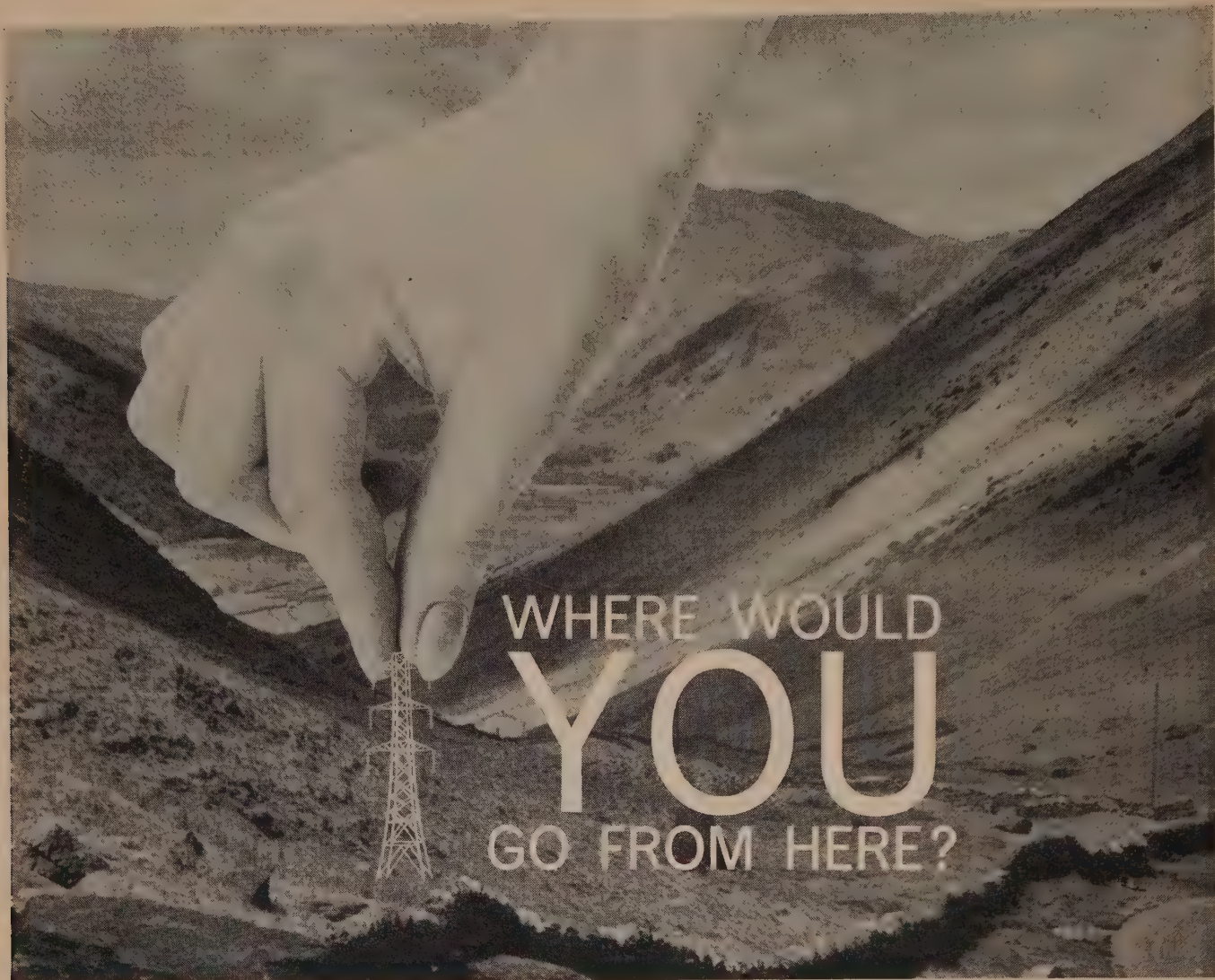
The Martindale Bin Tool—one of the very useful standard attachments to the Martindale Blower is invaluable in removing dirt and dust from bin stored items such as Nuts, Bolts, Screws, Washers, Clips, etc.




Every factory, works and stores has a task which can be performed by the versatile Martindale Blower. In removing either by Suction or Blowing harmful dust from all mechanical appliances, machinery can be kept running longer and expensive overhaul avoided. For "drying out" too a Martindale Blower fitted with a "Simoom" Heater Unit saves hours.

Write for full details of Martindale Blowers to:

**MARTINDALE ELECTRIC CO. LTD. 4 Westmorland Road, London, N.W.9 Tel: COLindale 8642**





**Suppose for a moment** that you are a wayleave officer working for the Central Electricity Generating Board. Your job is to plot a line bringing new power to an expanding town in the valley over the hill. Where do you go from here?  The easiest and cheapest way would be up and across the crest of the hill. But the people in the valley (and the people visiting the valley) will take rather a poor view of that. By-pass the ridge and march down the valley itself? That would involve a three-mile detour, extra expense, and some unsightly angle towers. Bury the cables underground? An attractive idea but an impossibly expensive one, which could raise installation costs 17 times—with inevitable repercussions on the cost of electricity.  There is no easy solution. But one must and will be found... one that fulfils the double duty which, by Act of Parliament, rests on the CEGB: to provide an efficient and economical electricity supply, while doing everything possible to preserve the natural amenities of the countryside.  Please think of this next time you grumble at the towers: they are being carefully planned by men who value the countryside as much as you do.

■ These advertisements are appearing in the farming and country magazines. The Central Electricity Generating Board thank electrical contractors for their co-operation in the past, and know that they will do all they can to preserve the amenities of the countryside.

Write for a copy of "Preserving Amenities" to  
The Central Electricity Generating Board, 75, Winsley Street, London, W.1.



the people who make  
your power in 234  
stations and distribute it  
through the 6677 miles  
of the National Grid



## Regional Guide to

**ELECTRICAL CONTRACTORS****LONDON****J. G. SNEATH LTD.**

13 Solebay Street, E.1

Telephone: STEpney Green 4021

Rewinds and Repairs.

Industrial Installations

Motor and Generator Repairs and Rewinds, Lighting and Power Installations. Factory Maintenance Contracts

**COLLINS ELECTRICAL LTD.**

115 Clerkenwell Road, E.C.1

Telephone: HOLborn 0212-3-4 &amp; CANonbury 3227-8

Lighting, Heating and Power Installations.

Motor Stockists

Factory Maintenance and

**C. J. FERGUSON & SONS LTD.**

33 Barbican, London, E.C.1

Telephone: MONarch 5474-5

**MUMFORD, BAILEY & PRESTON LTD.**

147 Farringdon Road, E.C.1

Telephone: TERminus 0647

Electrical, Heating, Air Conditioning, Ventilating and Plumbing Engineers and Contractors

**DUNCAN WATSON (ELECTRICAL ENGINEERS) LIMITED**

Andrew House, 60 Worship Street, London, E.C.2

Telephone: BIShopsgate 4752

Also at Castle Moat Chambers, Bath Place, Taunton

**THE PHOENIX ELECTRICAL CO. (LONDON) LTD.**

Electrical Engineers and Contractors

Head Office: Phoenix House, 16-18 Marshalsea Road, London, S.E.1

Telephone: HOP 4834

Industrial Installations. Power, Heating and Lighting. Factory Maintenance. Electrical Engineers. Break-down Specialists

**F. A. ORRICK & CO. LTD.**

157 Camberwell Road, S.E.5

Telephone: RODney 5548

**BARLOW & YOUNG LTD.**

55 Catherine Place, Westminster, S.W.1

Telephone: VICtoria 7373

Installations of all Types

Electrical Engineers and Contractors since 1888

**BELSHAW & CO. LTD.**

351 Brixton Road, S.W.9

Telephone: BRI 0692/3

**BERKELEY ELECTRICAL ENG. CO. LTD.**

Vincent House, Vincent Square, S.W.1

Telephone: VICtoria 8051

Electrical Engineers and Contractors

Founded 1903

**H. J. CASH & CO. LTD.**

Caxton House, Tothill St., S.W.1

Whi 4774

Electrical, Heating and Ventilating

Air-Conditioning Engineers

**DRAKE & GORHAM (Contractors) LTD.**

36 Grosvenor Gardens, Westminster, S.W.1

Telephone: SLOane 0121

Electrical Engineers and Contractors

**JAMES SCOTT & CO. (ELECTRICAL ENGINEERS) LTD.**

20 Grosvenor Place

Argyle Way, Stevenage

London, S.W.1

Herts

Telephone: Sloane 7278

Telephone: Stevenage 1933

Britain's Largest Electrical Installation Organisation for all high-class Electrical Installation and Instrumentation

One of the Largest Electrical Contractors in the Industry

**ELECTRICAL INSTALLATIONS LTD.**

65 Vincent Square, Westminster, S.W.1

Telephone: VICtoria 2266 (10 lines)

... for all electrical installations

**F. H. WHEELER & CO. LTD.**

39 Victoria Street, S.W.1

Telephone: ABBey 8080 (8 lines)

Electrical Engineers and Contractors for over 50 years

**TROUGHTON & YOUNG LTD.**

Imperial Court, Basil Street, Knightsbridge, S.W.3

Telephone: KENsington 3444 (20 lines)

**BURDETTE & CO. LTD.**

150 Clapham Manor Street, S.W.4

Telephone: MACaulay 4555

Industrial Installations. Motor and Generator Repairs. Metallizing Treatments. Complete Electrical Maintenance. Heating and Ventilating

**WILSON ELECTRIC (BATTERSEA) LTD.**

1-7 Radstock Street, S.W.11

Telephone: BATTERsea 3343 (4 lines)

Electrical Engineers and Contractors. Motor Rewinds and Repairs. Installations. "Delco" Electric Motors—Approved Stockists and Repairers

**HIGGINS & CATTLE LTD.**

21 Orchard Street, W.1

Telephone: HUNTER 1921/5

Electrical Engineers and Contractors

**CABLE JOINTERS LTD.**

ELECTRICAL ENGINEERS AND CONTRACTORS

229 High Street, London, W.3

Telephone: ACORn 7811

**A. A. ELECTRICAL CO. LTD.**

67 Rothschild Road, Chiswick Park, W.4

Telephone: CHI. 5185 &amp; 5605

Motor Generator Repairs and Rewinds. Industrial and Crane Installations. Power, Heating and Lighting, Factory Maintenance. Breakdown Specialists. Power Factor Planning. Electrical Plant Stockists.

Industrial Installations throughout the Country. Power, Maintenance and Insurance

**CITY ELECTRICAL CO.**

Emerald Street, W.C.1

Telephone: HOL. 9722 (6 lines)

Repairs and Rewinds—Motor Stockists

ENGINEERS SINCE 1820

**ALLIANCE ELECTRICAL CO. LTD.**

2 Henrietta Street, W.C.2

Telephone: COV. 0971

For electrical installations of any kind and size

**CHARING CROSS ELECTRICAL INSTALLATION CO. LTD.**

61 Chandos Place, Strand, W.C.2

Telephone: TEMple Bar 5188

Lighting, Heating and Power Installations. Electrical Maintenance.

**J. H. PLANT LTD.**

97/99 St. Martin's Lane, W.C.2

Telephone: TEMple Bar 0611 (5 lines)

Electrical Engineers and Contractors

**WILLIAM STEWARD & COMPANY LTD.**

154 Albany Street, N.W.1

Telephone: EUSton 3763

Electrical Engineers and Contractors

**A. TINDALL & SONS**

22 Rosemary Avenue, Enfield

Electrical Engineers and Contractors

Telephone: ENField 6612 (3 lines)

**T. A. BOXALL & CO.**

53 Victoria Street, S.W.1

Telephone: SULLivan 4103

Electrical Engineers and Contractors Home and Overseas

**F. W. BLANSHARD LTD.**

23 Lansdowne Road, Purley, Surrey

Telephone: UPLands 4818, 4819 &amp; 4810

Complete electrical installations. Rewinding and repair of motors and transformers. Manufacturers of control gear for fluorescents

**SERVICE ELECTRIC CO. LTD.**

Secomak Works, Honeypt Lane, Stanmore, Middx.

Telephone: EDGware 5566-7-8-9

Electrical Installations of every kind. Motor Rewinds. Factory Maintenance

**DYNAMO & MOTOR REPAIRS LTD.**

North End Road, Wembley Park

Telephone: WEMbley 3121

Motor and generator repairs and rewinds. Installations and factory maintenance. Electrical plant stockists

Electrical Contractors

**CABLE JOINTING & ERECTION CO.**

Pavilion Buildings, Trent Bridge, Nottingham

Telephone: NOTtingham 8.887

Cable Jointing. Cable Laying. Keenest Prices.

**SOUTH EASTERN****BURBIDGE, CLOUGH SMITH LTD.**

32 St. James's Street, Brighton

Telephone: BRIGHTon 63201-2-3

Electrical Engineers and Contractors

(Continued on page 104)



(Continued from page 103)

Electrical, Refrigeration and Radio Engineers. Lifts, Television Installation Contractors.

**H. BENEY & SONS LTD.**  
99 South Street, Eastbourne  
Telephones 4820/1 (Day and Night)

For first-class A.C. and D.C. Rewinds and Industrial Plant Maintenance

**ELECTRICAL POWER REPAIRS (Gillingham) LTD.**  
Strover Street, Gillingham, Kent  
Telephone: Gill. 5200 & 59356 (Day and Night)

**HOLLISTER'S (Electrical Contractors) LTD.**

Gravesend 22 Parrock Street Phone: Gravesend 4139 Gillingham 20 Rock Avenue Phone: Gillingham 50629

Electrical Installations

**T. A. BOXALL & CO.**  
20 Balcombe Road, Horley

Telephone: Horley 4388

Electrical Engineers and Contractors Home and Overseas

**F. W. BLANSHARD LTD.**  
23 Lansdowne Road, Purley, Surrey  
Telephone: Uplands 4818, 4819 & 4810

Complete electrical installations. Rewinding and repair of motors and transformers. Manufacturers of control gear for fluorescents

**R. & B. SIMS**

28 The Broadway New Haw, Weybridge, Surrey Telephone: BYFLEET 2218 11 Claremont Road West Byfleet, Surrey Telephone: BYFLEET 45218/43304

Wiring Installations, Refrigeration Engineers, Lighting Consultants, Floor Heating Engineers, Factory Maintenance, etc.

### SOUTHERN

... for all electrical installations  
**F. H. WHEELER & CO. LTD.**  
32 Brassey Road, Winton, Bournemouth  
Telephone: Winton 1609

Electrical Contractors

**THODAY & LONGMAN LTD.**  
73 High Street, Lymington, Hants  
Telephone: Lymington 3267 (2 lines)

... for all electrical installations

**F. H. WHEELER (Southern) LTD.**  
Clifton Hall, Oakley Road, Shirley, Southampton  
Telephone 73867 & 76056

**GOATER & MEDWAY LTD.**  
Electrical Engineers

7 Carlton Place, Southampton  
Telephone 28980

Cable Jointing. Cable Laying. By Direct Contract and to the Trade.

### SOUTH' WESTERN

... for all electrical installations  
**F. H. WHEELER (Bristol) LTD.**  
37 Victoria Street, Bristol 1  
Telephone 26907

**N. G. BAILEY & CO. LTD.**  
Electrical and Mechanical Contractors  
West India House, 54 Baldwin Street, Bristol 1  
Telephone 21586

Also at: Leeds, Ilkley, London, Manchester, Sheffield, Cardiff and Scunthorpe

**WESTERN DYNAMO AND MOTOR COMPANY**  
Summerland Street, Exeter

Telephone 58421/2

Motor, generator and transformer rewinds. Lighting and power installations. Factory maintenance

**CLARKE BROS. (Stroud) LTD.**  
Bath Road, Stroud  
Telephone: Stroud 1132/3

Electrical Engineers and Contractors  
Rewinds and Repairs. Industrial Installations

### EASTERN

**FYFE, WILSON & CO. LTD.**  
Station Works, Bishop's Stortford, Herts.  
Telephone: Bishop's Stortford 1000/11/2

Stockists of Industrial Motors, Alternators, Control Gear, Transformers, Diesel and Steam Engines and Generator Sets. Repairs and re-winds. Industrial Installations.

Norwich. . . . Cambridge. . . . Gt. Yarmouth. . . . Lowestoft. . . . Ipswich

**EASTERN & HOME COUNTIES ELECTRICAL CONTRACTORS**  
Specialists in Large Scale Electrical Installation Contracts.  
Electra House, Southtown Road, Gt. Yarmouth  
Telephone: Gt. Yarm. 2390

**ELECTRICAL ENGINEERS & CONTRACTORS**  
**PLAYFORD & SON LTD.**

Chantry House, High Street, Newmarket  
Telephone 3353/4 and 2795

### EAST-MIDLANDS

Electrical Engineers and Contractors  
**C. A. J. BILLINGTON LTD.**  
Cranfield, Bedfordshire

Telephone: Cranfield 293

Industrial Installation throughout the Home Counties

Electrical Contractors

**CABLE JOINTING & ERECTION CO.**  
Pavilion Buildings, Trent Bridge, Nottingham  
Telephone: Nottingham 84887  
Cable Jointing. Cable Laying. Keenest Prices.

For all types of Electrical Installations

**W. J. FURSE & CO. LIMITED**  
Traffic Street, Nottingham

Telephone: 83471 (5 lines)

Electrical Engineering Contracting Specialists

### MIDLANDS

**WALKER BROS. (ELECTRICAL ENGINEERS) LTD.**  
Contracts Dept., 12-13 Bath Street, Birmingham 4

Telephone: NORTHERN 5288

Electrical Installation Engineers. Industrial Installation Specialists  
Established 1895

**HARRIS & SHELDON LTD.**

45 College Road, Perry Barr, Birmingham 22

Telephone: Birchfields 5801

For all electrical contracting installations, lighting, heating, power, public address, etc.

Electrical and Mechanical Engineers, Factors

**THE BIRMINGHAM POWER TRANSMISSIONS LTD.**  
117/118 Snow Hill, Birmingham 4  
Telephone: AST. 2088-9

... for all electrical installations

**F. H. WHEELER & CO. LTD.**  
553 Moseley Road, Birmingham 12  
Telephone: Calthorpe 2601-2

**DYNAMO & MOTOR REPAIRS LTD.**

Belgrave Terrace, Soho Road, Birmingham 21

Telephone: Northern 0898

Motor and generator repairs and rewinds. Installations and factory maintenance. Electrical plant stockists

**ELECTRICAL INSTALLATIONS LTD.**

Faraday Works, Stoney Stanton Road, Coventry

Telephone 21076-7-8

Industrial Electrical Work of All Kinds. Over 50 Years' Experience

Electrical Contractors

**CABLE JOINTING & ERECTION CO.**  
Pavilion Buildings, Trent Bridge, Nottingham  
Telephone: Nottingham 84887  
Cable Jointing. Cable Laying. Keenest Prices.

For all types of Electrical Installations

**W. J. FURSE & CO. LIMITED**  
Traffic Street, Nottingham

Telephone: 83471 (5 lines)

Electrical Engineering Contracting Specialists

Electrical Engineers and Consultants

**W. H. TAYLOR (WOLVERHAMPTON) LTD.**  
Heantun House, Salop Street  
WOLVERHAMPTON  
Telephone 21687

### SOUTH WALES

**DRAKE & GORHAM (Contractors) LTD.**

13 St. Andrew's Crescent, Cardiff

Telephone: Cardiff 32080

Electrical Engineers and Contractors

... for all electrical installations

**F. H. WHEELER & CO. LTD.**  
117 Woodville Road, Cardiff

Telephone 21281-2

Telegrams: "Whelect"

**N. G. BAILEY & CO. LTD.**

Electrical and Mechanical Contractors

**Andrews Building, 67 Queen Street, Cardiff 1**  
Telephone 29639

Also at: Leeds, Ilkley, London, Manchester, Sheffield, Bristol and Scunthorpe

**CLARKE BROS. (Stroud) LTD.**

High Street, Merthyr Tydfil

Telephone: Merthyr Tydfil 3377

Electrical Engineers and Contractors  
Rewinds and Repairs. Industrial Installations

(Continued on page 105)



(Continued from page 104)

**W. J. FURSE & CO. (MANCHESTER) LTD.**  
 Royal Buildings, Talbot Road, Port Talbot  
 Telephone: Port Talbot 3276  
 For Electrical Installations and Contract Work

**MERSEYSIDE & N. WALES**

Electrical Engineers and Contractors for over 50 years  
**TROUGHTON & YOUNG LTD.**  
 46 Rodney Street, Liverpool 1  
 Telephone: Royal 9231

**HIGGINS & CATTLE LTD.**  
 322 India Buildings, Water Street, Liverpool 2  
 Telephone: Liverpool Central 1729  
 Electrical Engineers and Contractors

ELECTRICAL INSTALLATIONS OF ALL TYPES  
**THE SANDON MOTOR & ENGINEERING COMPANY LIMITED**  
 1-3 Grundy Street, Liverpool 5  
 Telephone: NOR. 2226 (4 lines) Telex 62438

**YORKSHIRE**

Electrical Engineers and Contractors  
**SOUTHERN & REDFERN LTD.**  
 Woodhead Road, Bradford 7  
 Textile Maintenance, Repairs and Rewinds  
 Telephones: Bradford 23871—Late Phone: Bradford 65837

**GREEN & SMITH LTD.**  
 Albert Works, Meadow Lane, Leeds 11  
 Telephone 20834-5-6  
 Industrial and Commercial Installations. Motor Sales and Repairs.  
 Electrical Floor Heating and Air Conditioning, etc.

... for all electrical installations  
**F. H. WHEELER & CO. LTD.**  
 44 Bank Street, Sheffield 1

Telephone 24015 (3 lines) Telegrams: "Whelect"

**N. G. BAILEY & CO. LTD.**  
 Electrical and Mechanical Contractors  
 10 Sharrow Lane, Sheffield 11  
 Telephone 53328

Also at: Leeds, Ilkley, London, Manchester, Cardiff, Bristol and Scunthorpe

Electrical Contractors  
**CABLE JOINTING & ERECTION CO.**  
 Pavilion Buildings, Trent Bridge, Nottingham  
 Telephone: Nottingham 84887  
 Cable Jointing. Cable Laying. Keenest Prices.

**NORTH WESTERN**

**ANGLO-AMERICAN ELECTRICAL COMPANY**  
 Olive St., Bury, Lancs.  
 Telephone: Bolton 27251

Electrical Installations: Power, Heating, Lighting.  
 Manufacturers of Fluorescent Fittings, Ballast Units, etc.

**DRAKE & GORHAM (Contractors) LTD.**  
 21 Newton Street, Piccadilly, Manchester 1  
 Telephone: Manchester Central 4701  
 Electrical Engineers and Contractors

... for all electrical installations  
**F. H. WHEELER & CO. LTD.**  
 Regal Buildings, Oxford Road, Manchester 1  
 Telephone: Central 8207-8

Industrial Installations  
**W. H. SMITH & CO. ELECTRICAL ENGINEERS LTD.**  
 Contracting Manufacturing Electronic Maintenance  
 12 York Street, Manchester 2 Shepley Estate, Audenshaw Grosvenor Street, Manchester  
 CENTral 2991-8 DENton 3961 ARDwick 5011

**W. J. FURSE & CO. (MANCHESTER) LTD.**  
 20 Mount Street, Manchester 2  
 Telephone: Blackfriars 5014-5-6  
 For Electrical Installations and Contract Work

**JAMES SCOTT & CO. (ELECTRICAL ENGINEERS) LTD.**  
 Bermuda House, 4/6 Hall Street, Manchester 2  
 Telephone: Manchester Central 3571  
 Britain's largest Electrical Installation Organisation for all high-class Electrical Installation and Instrumentation

**NORTH EASTERN**

**COX-WALKERS LTD.**  
 North Eastern Electric Works, Feethams, Darlington  
 Electrical Contractors of repute since 1880. Motor Rewinds and Manufacturing Engineers  
 Telephone: 66277/8

Engineers and Contractors  
**CITY ELECTRICAL CO.**  
 Turks Head Yard, Cecil Street, Lincoln  
 Telephone: Lincoln 124 London: HOLborn 9722

**NORTH OF ENGLAND ENGINEERING & ELECTRICAL CO. LTD.**  
 Ferryhill 86 Ryhope Rd. Palladium Buildings  
 Co. Durham Sunderland Middlesbrough  
 Tel: 435/6 Tel: 58762 Tel: 88156  
 ELECTRICAL INSTALLATION CONTRACTORS

**JAMES SCOTT & CO. (ELECTRICAL ENGINEERS) LTD.**  
 Argyle House, Argyle Street, Newcastle-upon-Tyne 1  
 Telephone 28605  
 Britain's Largest Electrical Installation Organisation for all high-class Electrical Installations and Instrumentations

... for all electrical installations  
**F. H. WHEELER & CO. LTD.**  
 52 Elswick Road, Newcastle  
 Telephone: Newcastle 36271

**SOUTH WEST SCOTLAND**

**JAMES SCOTT & CO. (ELECTRICAL ENGINEERS) LTD.**  
 80/110 Finnieston Street Glasgow, C.3 21/25 George IV Bridge Edinburgh  
 Telephone: Central 3866 Telephone: Central 6424  
 Britain's Largest Electrical Installation Organisation for all high-class Electrical Installation and Instrumentation

**REPUBLIC OF IRELAND**

Electrical Engineering Contractors  
**A. G. BRUTY LIMITED**  
 38 Dawson Street, Dublin  
 Telephone: Dublin 73181

Applications for particulars of costs and standard style of advertisements in this Regional Guide should be addressed to:

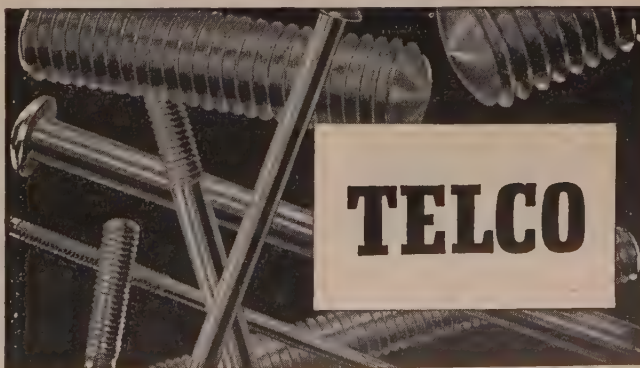
THE  
 ADVERTISEMENT DEPARTMENT  
 ELECTRICAL REVIEW  
 DORSET HOUSE STAMFORD STREET  
 LONDON S.E.1

**FLASH TESTER**

Improved design to meet present-day requirements under latest B.S.S. specifications  
 Variable test potential between 500 volts to 3,000 volts, and controlled by suitable switching and indicated on clear scale instrument.  
 Faults are clearly indicated by VISUAL AND AUDIBLE devices.  
 High grade test prods with retractable electrodes.  
**PRICE—£51 19s. 6d. nett Trade.**  
 Demonstration can be arranged.  
 Send for illustrated leaflet No. 25Q.

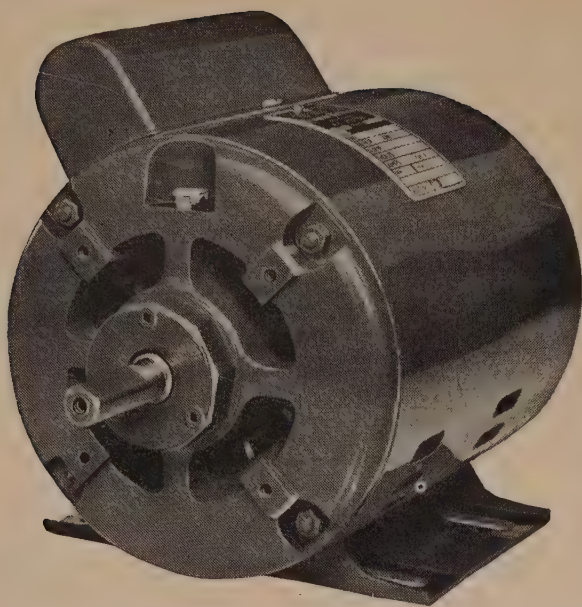


**Runbaken**  
 MANCHESTER • 1



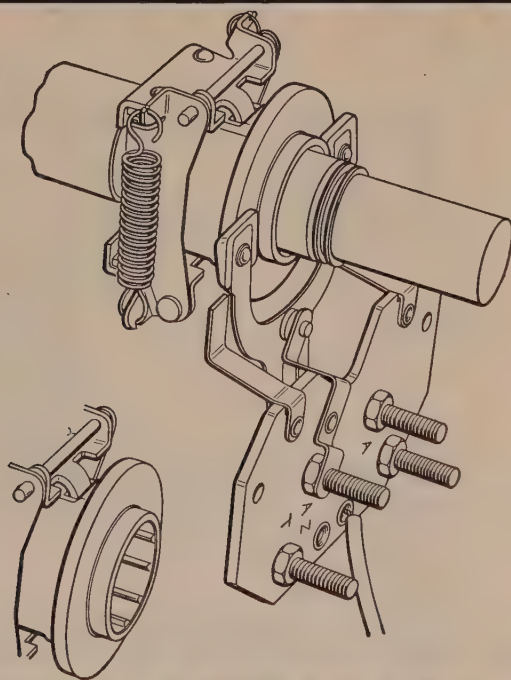
**Studding - Studs - Allthreads - Tie Rods**  
**TELCO LTD.**, 3 Newman Street, London, W.1 MUSEum 5701/4  
 and 41-2 Ellis Street, Birmingham 1 Midland 7421/3





F.H.P. motors are not expensive machines yet they have to be extraordinarily robust and absolutely reliable—often with very little maintenance. Designing for this kind of reliability at a competitive price is far beyond the realms of text-book formulæ. The things that distinguish a really successful design are often details—but important ones—based on knowledge won the hard way; from years of making motors and servicing them in the conditions under which they run.

## This thing called know-how



A detail of this kind is the centrifugal switch on our split-phase and capacitor-start motors. The problem with such switches is to derive a snap action on both opening and closing from an operating force that increases and decreases smoothly. In the switch shown here the restraining springs are so designed that their leverage decreases as the fly-weights open. Thus, increasing centrifugal force meets decreasing resistance and, at the set speed, wins outright; the collar snaps back smartly opening the contacts at the base of the yoke. On test, switches have snapped open and closed well over 1,000,000 times without failure—a level of reliability typical of the motors themselves.

# Crompton Parkinson

LIMITED



Makers of Electric Motors of all kinds, A.C. and D.C.  
Generators, B.E.T. Transformers, Switchgear, Cables,  
Instruments, Lamps, Lighting Equipment, Batteries,  
Stud Welding Equipment, Traction Equipment, Ceiling Fans.

CROMPTON PARKINSON LTD • CROMPTON HOUSE • ALDWYCH • LONDON • WC2

F612



# Classified Advertisements

CLASSIFIED advertisements are PREPAID at 4/- per line (approx. 6 words).

DISPLAYED CLASSIFIED:—58/- per single column inch.

Where an advertisement includes a Box Number there is an additional charge of 1/-.

SERIES DISCOUNTS for consecutive insertions:—13, 5%; 26, 10%; 52, 15%.

SITUATIONS WANTED:—Three insertions under this heading can be obtained for the price of two if ordered and prepaid with the first insertion.

Remittances payable to "ELECTRICAL REVIEW."

REPLIES TO BOX NUMBERS should be addressed to the Box Number in the advertisement, c/o ELECTRICAL REVIEW, Dorset House, Stamford Street, London, S.E.1. If an applicant for a situation appearing under a Box Number does not wish his reply to be forwarded to a particular firm or individual, instructions to this effect should be addressed to the Advertisement Supervisor, ELECTRICAL REVIEW. The name of an advertiser using a Box Number cannot be disclosed.

## OFFICIAL NOTICES, TENDERS, ETC.

### NOTICE TO WATER TURBINE AND WATER TURBINE-DRIVEN GENERATOR MANUFACTURERS

#### WATER AND POWER DEVELOPMENT AUTHORITY, WEST PAKISTAN

Indus Basin Development:  
Mangla Dam Project

THE WATER AND POWER DEVELOPMENT AUTHORITY, West Pakistan, expect to issue tender documents within the next six months for the manufacture and delivery C.I.F. Karachi of three 138,000 horse-power vertical shaft Francis Water Turbines, and within the next year for the manufacture and delivery C.I.F. Karachi of three 100-megawatt Generators to be driven by the turbines, and the machines to be installed in the Mangla Power Station.

Manufacturers interested in tendering for either:—

- (i) the water turbines,
- (ii) the generators, or
- (iii) both the water turbines and the generators

are invited to apply at once for a Summarised Description of the Work either to:—

The Chief Engineer,  
Mangla Dam Project,  
P.O. Mangla Headworks,  
District Jhelum,  
West Pakistan;

or to the Mechanical and Electrical Consultants:

Messrs. Preece, Cardew & Rider,  
8, 10 & 12, Queen Anne's Gate,  
Westminster,  
London, S.W.1, England;

in association with the Consulting Engineers for the Mangla Dam Project:—

Messrs. Binnie, Deacon & Gourley,  
Artillery House, Artillery Row,  
London, S.W.1, England.

Manufacturers who, after studying the Summarised Description, wish to be placed on the list of tenderers, should send an application, in English, to the Mechanical and Electrical Consultants, giving details of their resources and of their experience in the manufacture of large vertical shaft water turbines and/or large vertical shaft water turbine-driven generators, including the magnitude and description of work which they have carried out, time when manufactured, and the names of the employers and consulting engineers responsible.

Applications to be placed on the list of tenderers must reach the Mechanical and Electrical Consultants not later than the end of June, 1961. Those firms considered to have sufficient experience and resources will be sent the tender documents in due course. 936

### BOROUGH OF EALING

#### Conversion of Filament to Sodium Lighting

Contract A: Supply of 3,600 Lantern Lamps and Control Gear.

Contract B: Supply of 1,500 Brackets and Control Gear Boxes.

Details obtained from the Borough Engineer, Town Hall, Ealing, London, W.5, on payment of £5 for each contract, returnable on receipt of a bona fide tender.

Closing date of tender, 30th May, 1961.

E. J. COPE BROWN,

Town Clerk. 977

### CITY AND COUNTY OF KINGSTON UPON HULL: TELEPHONE UNDERTAKING

Tenders for Supply and Installation of Switching Equipment for New Central Automatic Telephone Exchange and Associated Manual Switchboard

FIRMS desirous of tendering for the above works, who before 1st June, 1961, establish with the Corporation in response to this advertisement that they possess the requisite resources and experience to undertake the manufacture and installation of a large modern public telephone exchange in the City of Kingston upon Hull, will in due course receive a formal invitation to tender and complete specification of the works to be undertaken.

An abridged specification showing the general scope of the proposed contract is now available and a copy will be supplied on application to the undersigned.

H. V. J. HARRIS, M.B.E., A.M.I.E.E.,  
Telephone Manager.

Kingston upon Hull Corporation  
Telephone Department,  
Mytongate,  
Hull, Yorkshire. 908

### COUNTY COUNCIL OF ESSEX

- (1) Braintree Margaret Tabor County Secondary School
- (2) Chelmsford Kings Road County Primary School
- (3) Hedingham County Secondary School

#### Renewal of Electrical Installations

CONTRACTORS wishing to submit firm price tenders for the above should forward their names, from which panels will be chosen and provided with tender documents.

The works consist of the renewal of the electrical installations using as much existing material as possible. The buildings will remain in occupation and the contracts include incidental builders' work. The estimated costs of the contracts are:—

- (1) £5,100. (2) £2,800. (3) £3,600.

Separate applications for each contract to reach the undersigned not later than 20th May, 1961.

H. CONOLLY, C.B.E., F.R.I.B.A.,  
County Architect.

County Hall,  
Chelmsford. 979

### BOROUGH OF WORKSOP

TENDERS are invited for the provision of eight Fluorescent Lighting Units, ten Socket Outlets and necessary wiring in a building at Carlton Road Tip, Worksop.

Tenderers may quote for:—

- (a) The supply only of lanterns, tubes and auxiliary gear.
- (b) The wiring and fixing of lanterns, etc.
- (c) The whole of the work.

Copies of the specification and form of tender may be obtained from the Borough Engineer, Park House, Worksop.

Tenders, in envelopes provided, must be forwarded to the undersigned so as to arrive not later than noon on Friday, the 26th May, 1961.

The Corporation do not bind themselves to accept the lowest or any tender.

R. C. PHARAOH,

Town Hall, Worksop.  
12th May, 1961.

Town Clerk. 974

Advertisements are accepted up to first post on Monday of the week of issue

If blocks, bold type or ruled borders are required then on Friday prior to week of issue

## WHITSUN

Classified Advertisements for the issue of 26th May should reach us by FIRST POST on FRIDAY, 19th MAY, if displayed with boxed rules or blocks by THURSDAY, 18th MAY

All communications to be addressed to: Classified Advertisement Department, ELECTRICAL REVIEW  
Dorset House, Stamford Street  
London, S.E.1

Original testimonials should not be sent with applications for employment

### URBAN DISTRICT COUNCIL OF COULSDON AND PURLEY

#### New Group "A" Sodium Lighting

- (a) Coulsdon Road and Stoats Nest Road, Coulsdon
- (b) Mayfield Road, Sanderstead Road and Sanderstead Hill, Sanderstead
- (c) Plough Lane, Purley
- (d) Upper Selsdon Road, Sanderstead

TENDERS are invited for the provision and erection of 182 Stanton Concrete Lighting Columns and the provision and fixing of 60-watt and 140-watt Sodium Lamps and G.E.C. Lanterns on the above roads, and the removal of the existing street lighting equipment.

Specification, bills of quantities and forms of tender, prepared by H. M. Collins, Engineer and Surveyor, may be obtained from him at the Council Offices, Purley, Surrey, upon receipt of a deposit of £4 4s., which will be refunded upon receipt of a bona fide tender and the return of documents supplied.

Plans and conditions of contract may be inspected at the office of the Engineer and Surveyor.

Sealed tenders in the envelope provided to be submitted by not later than first post on Monday, 29th May, 1961.

The Council do not bind themselves to accept the lowest or any tender.

ERIC F. J. FELIX,  
Clerk of the Council.

980

### METROPOLITAN BOROUGH OF LEWISHAM

#### Street Lighting

TENDERS are invited for the conversion of:—

- (1) Approximately 190 Group A lighting units from Mercury to 140-watt Sodium.
- (2) Approximately 242 Group A lighting units from Mercury to 200-watt Linear Sodium.
- (3) 3 Group B lighting units from Mercury to 60-watt Sodium.
- (4) For the erection of approximately 81 Group A Steel Columns complete with 200-watt Linear Sodium Lanterns, etc.

Particulars and form of tender from the Borough Engineer, Lewisham Town Hall, Catford, London, S.E.6.

Closing date 10 a.m., Thursday, 25th May, 1961. 921

### INDIA STORE DEPARTMENT

THE Director General, India Store Department, Government Building, Bromyard Avenue, London, W.3, invites tenders for the supply of 150 A.F. Attenuators, variable impedance 600 ohms.

Forms of tender, which are returnable on Monday, 12th June, 1961, may be obtained from this office (CDN Branch) upon payment of a fee of 10s., which is not returnable. Ref. No. 3504/61 (CDN) must be quoted in all applications. 978



**Official Notices (continued)****CITY OF ST. ALBANS****Group "A" Concrete Street Lighting Columns**

QUOTATIONS are invited for the supply only of Group "A" Concrete Street Lighting Columns for an extensive conversion scheme.

Specification with schedule may be obtained from the City Engineer and Surveyor, 16, St. Peter's Street, St. Albans.

Quotations, in plain sealed envelopes endorsed "Group A Lighting," are to be delivered to the undersigned not later than 12 noon, Thursday, the 1st June, 1961.

B. V. ENTWISTLE,  
38, St. Peter's Street, Town Clerk.  
St. Albans, Herts. 937

**SITUATIONS VACANT**

(See "Replies to Box Numbers" on page 107)

**CENTRAL ELECTRICITY  
GENERATING BOARD****Eastern Division**

APPLICATIONS are invited for the following appointment in the Divisional Electrical Department:—

FOURTH ASSISTANT ENGINEER,  
FINCHLEY (East) TECHNICAL  
SECTION (S.V. No. 1467).

Salary N.J.B. Class AX, Grades 11-9, Scales 7-9, £855-£1,245 per annum.

The commencing salary will be within the above range according to qualifications and experience.

Previous experience in the commissioning or manufacture of high-voltage electrical plant as used in the Board's generating stations or Grid transmission system is desirable.

A knowledge of the design and testing of protective gear would be an advantage.

Applicants should possess a Higher National Certificate in Electrical Engineering or its equivalent.

The applicant appointed will be required to reside in the South East Essex area.

Applications, quoting Reference S.V. No. 1467, stating age, qualifications, experience and present position, should be sent to the Controller, Central Electricity Generating Board, Eastern Division, West Farm Place, Chalk Lane, Cockfosters, Barnet, Herts., to arrive not later than 20th May, 1961. 914

**ASSISTANT  
ELECTRICAL ENGINEER**

A LARGE processing company requires an ASSISTANT ELECTRICAL ENGINEER in the Chief Engineer's Department, Head Office.

Candidates should be in the age range 25-30 and must be Graduates of the Institution of Electrical Engineers. Additionally, candidates must have a University Degree or a D.F.H. Experience in some of the following fields would be an advantage:—

- Modern techniques of electrical installation work in large factories, including substations and cable work.
- Electricity supply.
- Rotating plant and variable speed drives.

The post offers a good commencing salary and scope for advancement for a capable person. The company has pension and profit-sharing funds and working conditions are of a very high standard. For married men unfurnished accommodation will be available and generous financial help towards moving costs is offered.

Please apply in writing to—Box 939.

**LAING****MECHANICAL AND ELECTRICAL SERVICES****JOHN LAING AND SON LIMITED**

requires

**ENGINEERS and DRAUGHTSMEN**

for design, specification and Site Supervision of Installations in major Industrial and Commercial Developments.

Experience and training desirable in one or more of the following fields:—

Electrical Installations

Heating, Ventilating and Air Conditioning

Industrial Processes

Appointments are available for both qualified Engineers and unqualified assistants.

These are interesting and progressive posts offering opportunities for further study and experience.

The Company operates a Pension Scheme, and offers good conditions of employment.

Applications, giving brief details, should be sent to Group Personnel Manager (ME6), John Laing and Son Limited, London, N.W.7

843

**LEEDS COLLEGE OF TECHNOLOGY**

Calverley Street, Leeds, 1

Principal: C. Chew, M.Sc.Tech., F.R.I.C.

**DEPARTMENT OF ELECTRICAL  
ENGINEERING AND PHYSICS**

APPLICATIONS are invited for the post of LECTURER IN ELECTRICAL ENGINEERING, duties to commence on the 1st September next.

Candidates should possess appropriate technical qualifications with good industrial experience; teaching experience would be a further recommendation.

Salary scale from £1,370 - £35 - £1,550 per annum.

Further particulars and form of application, to be returned as soon as possible, may be obtained by sending a stamped addressed foolscap envelope to the Principal of the College.

GEORGE TAYLOR,

Chief Education Officer.

960

**CENTRAL ELECTRICITY  
GENERATING BOARD****South Thames Division****Kingston Power Station****OPERATION SUPERINTENDENT**  
(Vacancy No. 141/61).

Applicants should have wide experience in the operation of generating plant and control of labour and H.N.C. (Electrical or Mechanical) would be an advantage.

The successful candidate will be responsible for the safe and efficient operation of the station, and for maintaining the stations high merit position by continuous development of techniques in the handling and burning of low grade fuels.

Salary N.J.B. Class G, Grade 5, £1,325-£1,460 per annum, including London allowance.

Applications, stating age, qualifications and experience, should be sent to the Station Superintendent, Kingston Power Station, Down Hall Road, Kingston-upon-Thames, Surrey, to arrive by 27th May. 982

**BOROUGH OF WILLESDEN****Borough Engineer and Surveyor's Department**

APPLICATIONS are invited for the appointment of SENIOR ELECTRICAL ENGINEERING ASSISTANT, salary within A.P.T. Grade III (£960/£1,140 p.a.).

Candidates must possess appropriate qualifications and should have experience in the design of electrical installation in multi-storey blocks of flats and public buildings.

The Council cannot assist with housing.

Full details and form of application may be obtained from the Borough Engineer and Surveyor, Town Hall, Dyne Road, Kilburn, London, N.W.6, and must be returned to the undersigned not later than 10 a.m. on Monday, 29th May, 1961.

R. S. FORSTER,

Town Clerk. 926

**SOUTH OF SCOTLAND  
ELECTRICITY BOARD****CHIEF ENGINEER**

THE Board require a CHIEF ENGINEER to be responsible for all matters relating to the generation, transmission and distribution of electricity in the Board's District.

The salary applying to the post is

£5,500 per annum.

Applications should be lodged with the Secretary of the Board, Inverlair Avenue, Glasgow, S.4, not later than 1st June next.

941



# BRUSH

A member of the Hawker Siddeley Group—Industrial Division

## DRAUGHTSMEN

TRANSFORMERS

SWITCHGEAR

ROTATING ELECTRICAL MACHINES

MOTOR CONTROL GEAR

ELECTRIC AND DIESEL ELECTRIC LOCOMOTIVES

(Mechanical, Control Gear and Electrical Machines)

GENERAL ENGINEERING

If you are a qualified Draughtsman and interested in one of the above vacancies, please apply to

Mr. A. Garner

Brush Electrical Engineering Company Limited  
Loughborough, Leicestershire

quoting reference: PL.9935 and giving brief details of your qualifications and experience.

ALL APPLICATIONS WILL BE TREATED IN THE STRICTEST CONFIDENCE.

The Company is situated some 15 miles from Leicester, Nottingham and Derby on the outskirts of a small town amid the pleasant Leicestershire countryside and away from the smoky industrial environment. Schooling facilities are good for all grades of education, including advanced studies at Technical Colleges and Universities in the district. In appropriate cases assistance with housing and removal expenses can be considered.

710

### ENGINEERING DESIGNER DRAUGHTSMEN

required by Air Ministry in London.

Salary (inner London scale) Grade III, £658-£1,048 (£866 at age 25), starting salary depends on age, quals. & exp.

**ELECTRICAL ENGINEERING DESIGNER DRAUGHTSMEN** experienced in preparation of schemes for illumination and electrical equipment of buildings or schemes for H.V. and M.V. electrical distribution (Grade III).

Candidates should have served a recognised apprenticeship or have had equivalent training and also adequate practical experience. Possession of recognised technical qualifications an advantage, financial assistance and time off may be allowed for recognised courses of study for technical qualifications. 5-day week with 18 days' paid leave p.a. initially. Promotion and pension prospects. Some overseas tours with special allowances in addition to salary.

Applicants, who must be natural born British subjects, should write (quoting Kings Cross O/N 803) to AIR MINISTRY, W.G.d., LACON HOUSE, THEOBALDS RD., LONDON, W.C.1, or to ANY EMPLOYMENT EXCHANGE, giving age, details of training, qualifications and full particulars of former posts held. Candidates selected will normally be interviewed in London and certain expenses reimbursed. Only candidates selected for interview will be notified. 252

### BOROUGH OF POOLE

Electrical Engineering Assistant  
A.P.T. Grade III (£960-£1,140)

APPLICATIONS for the above post are invited from properly trained electrical engineers of not less than Higher National Certificate standard.

Applicants must have had design and estimating experience as consumers' or contracts engineers, and be capable of supervising works on contract sites. The work will be related to the internal and external electrical installations met with in the Council's engineering and architectural branches, and some knowledge of street lighting would be an asset.

Application forms and details of the appointment from the Borough Engineer, Poole, Dorset, and must be returned to me by 24th May, 1961.

J. G. HILLIER,

Town Clerk. 923

### CENTRAL ELECTRICITY GENERATING BOARD

Eastern Division

APPLICATIONS are invited for the following appointment at South Denes Generating Station (Gt. Yarmouth, Norfolk):—

**ASSISTANT ENGINEER**  
(Efficiency and Testing)  
(S.V. No. 1492).

Salary N.J.B. Class J, Grade 6, Scale 12, £1,350-£1,500 per annum.

Applicants should possess the H.N.C. in Mechanical and/or Electrical Engineering. Previous experience in the efficient operation and testing of modern boilers and turbo-alternators with associated plant is essential.

Applications, quoting Staff Vacancy No. 1492, stating age, qualifications, experience and present position, should be sent to the Controller, Central Electricity Generating Board, Eastern Division, West Farm Place, Chalk Lane, Cockfosters, Barnet, Herts., to arrive not later than 20th May, 1961. 915

### THE POWELL DUFFRYN HEATING AND AIR TREATMENT DIVISION

are extending their RESEARCH AND DEVELOPMENT LABORATORIES at Camberley, Surrey, and invite applications for the following appointments:

**TWO SENIOR DEVELOPMENT ENGINEERS—age 27 to 40**

A University degree or equivalent professional qualifications in engineering (essential), fuel technology or physics (desirable) and some practical development experience and training required.

One for ELECTRICAL Equipment

One for HEATER, BATTERIES AND EXCHANGERS, RADIATORS AND AIR CONDITIONING Equipment.

Experience in development of these types of appliances is essential and some knowledge of solid fuel and oil fire development would be an advantage since work on these will also be carried out at the same laboratories.

**DEVELOPMENT ASSISTANTS—age 20 to 30.** G.C.E. 'A' level in Physics or Chemistry and Maths or equivalent qualifications essential. Experience desirable in development of electrical or heating exchange equipment.

These appointments are for a progressive career in an expanding organisation.

Applications will be treated in strict confidence and request for application forms quoting reference 4D/61 should be made to:

The Group Personnel Officer, Powell Duffryn Limited, 8 Great Tower Street London, E.C.3 839

### CITY AND COUNTY OF BRISTOL

Appointment of Mechanical/Electrical Engineers  
(Grade A.P.T. IV, £1,140/£1,310 p.a.)

APPLICATIONS invited from qualified MECHANICAL/ELECTRICAL ENGINEERS for posts in Main Drainage Section of the City Engineer and Planning Officer's Department.

Candidates should be experienced in design and operation of large mechanical and electrical plant, involving generation and transmission at high voltage, high-voltage and medium-voltage switchgear and control gear, and operation of large pumping stations. They should have obtained a British university degree in engineering and/or be corporate members of appropriate professional institution and have appropriate experience for the post.

Posts permanent, pensionable; medical examination and, except in case of an officer transferred from service of another local authority, probationary period of six months.

Five-day week; staff restaurant facilities.

Housing needs of successful candidates and question of a contribution towards removal expenses will receive favourable consideration.

Applications should be arranged in following order: Age, nationality and whether married or single; education; training; professional qualifications; present post with salary and date of appointment; previous posts with salaries and dates of appointment; details of experience; any further remarks in support of application; notice required to terminate present appointment; whether related to a member or senior officer of the Council; names of two referees.

Canvassing disqualifies.

Applications to City Engineer and Planning Officer, Cabot House, Deanery, Bristol, 1, by 29th May. 929

### SOUTH OF SCOTLAND ELECTRICITY BOARD

APPLICATIONS are invited for a super-annuable position as a FOURTH ASSISTANT ENGINEER (Electrical) in the Distribution/Transmission (Construction) Section of the Chief Engineer's Department at Board Head Office.

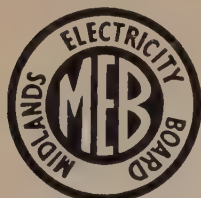
Applicants should have had a sound engineering and technical training with qualifications leading to Corporate Membership of the Institution of Electrical Engineers and at least two years' practical experience of H.V. and L.V. construction work. The successful applicant will be required to assist with preparation of specifications for and handling of switchgear, transformer and other contracts associated with primary distribution and the L.V. part of 275-kV and 132-kV substations, including supervision of erection work on site.

Salary N.J.B. Class BX, Grade 10, £935/£1,245 per annum.

Applications on the standard form, quoting reference E14/61, should be returned to the Secretary, South of Scotland Electricity Board, Inverlair Avenue, Glasgow, S.4, not later than 22nd May, 1961. 999



## Situations Vacant (continued)



# **MIDLANDS ELECTRICITY BOARD**

APPLICATIONS are invited for the following superannuable posts:—

## **Central Gloucestershire Area**

### **FIRST ASSISTANT (Stroud).**

The successful applicant will be required for sales promotion duties. Candidates should have a sound commercial background including a thorough knowledge of modern sales promotion methods and techniques, and should be capable of organising sales campaigns and sales promotion activities designed to develop the sale of electrical appliances. Duties will include supervision of service centres, demonstrators and outside sales representatives. Appropriate qualifications desirable. Salary £1,115/£1,245 per annum (N.J.B. Grade F.6) according to qualifications and experience.

### **THIRD ASSISTANT ENGINEERS**

(Control) (two) (Area Office).

The successful applicants will be required to take full shift responsibilities for all functions associated with high-voltage system control. Applicants should have had sound technical training together with experience of switching operations and maintenance work on H.V. distribution equipment. Technical qualifications desirable. Salary £1,115/£1,245 per annum (N.J.B. Grade K.10) plus 10% shift enhancement when on shift duty.

Apply by letter within 14 days, stating age, experience, qualifications, present position and salary, to Mr. S. Raybould, Area Manager, Midlands Electricity Board, Eastern Avenue, Gloucester.

## **North Staffordshire Area**

### **FIRST ASSISTANT**

(Commercial Engineering Department)  
(Newcastle, Staffs).

The successful applicant will be required for sales promotion duties. Candidates should have a sound commercial background including a thorough knowledge of modern sales promotion methods and techniques, and should be capable of organising sales campaigns and sales promotion activities designed to develop the sale of electrical appliances. Duties will include supervision of service centres, demonstrators and sales representatives. Appropriate qualifications desirable. Salary £1,115/£1,245 per annum (N.J.B. Grade F.6).

Apply by letter within 10 days, stating age, qualifications, experience, present position and salary, to Mr. C. C. Pimble, Area Manager, Midlands Electricity Board, 234, Victoria Road, Fenton, Stoke-on-Trent.

## **Shropshire and Herefordshire Area**

### **THIRD ASSISTANT DISTRICT**

ENGINEER (Leominster).

Applicants should have had experience in the construction and maintenance of high and medium-voltage distribution systems. Technical qualifications desirable. Salary £765/£870 per annum (N.J.B. Grade D.9).

Apply by letter within 14 days, stating age, qualifications, experience, present position and salary, to Mr. W. Winwood, Area Manager, Midlands Electricity Board, Spring Gardens, Ditherington, Shrewsbury.

F. W. CATER,  
Secretary. 954

## **NEWPORT AND EAST MONMOUTHSHIRE HOSPITAL MANAGEMENT COMMITTEE**

ASSISTANT ENGINEER required who will be based at St. Woolos Hospital, Newport, but will also work at other hospitals in the Group, when travelling time and travelling expenses will be claimable. The successful candidate will be engaged on the maintenance of certain electrical and electronic equipment, and some knowledge of this type of work is required.

Salary £655 × £20 (2) × £30 (3) to £795.

Write stating experience and two referees to T. A. Jones, Group Secretary, 64, Cardiff Road, Newport, Mon. 986

## **PIRELLI-GENERAL CABLE WORKS LTD.**

have vacancies for the following grades of staff:—

## **ASSISTANT ENGINEERS**

Assistant Engineers for supervision of cable contracts, including oil-filled cable to the highest voltages. Applicants should have qualifications not less than O.N.C.

## **SITE CLERKS**

For work in connection with invoicing, records and P.A.Y.E.

## **DRAUGHTSMEN**

Draughtsmen qualified to carry out steel-work design for power station and industrial cable installations, also route record draughtsmen.

## **FOREMEN**

Foremen with experience of power station and industrial installations, also of trenchwork and mains cable laying.

Applicants must be prepared to travel to work on contract sites or in area offices throughout Great Britain, and willingness to travel abroad is also desirable.

An outside allowance will be paid when working on contract sites.

Application should be made to the

Manager, Installation Division  
**PIRELLI-GENERAL CABLE WORKS  
LTD.**

Leigh Road, Eastleigh, Hants

987

## **LONDON ELECTRICITY BOARD**

### **Vacancies: Assistant Accountants**

APPLICATIONS are invited from accountants experienced in large-scale clerical and mechanised accounting procedures and the control of staff for appointments as Assistant Accountant in two of the Board's Accounting Centres, as follows:—

North West London: 19, Carnaby Street, London, W.1.

North East London: 320, High Road, Ilford, Essex.

The salary of each post will be in accordance with Class C, Grade 4 of the National Joint Managerial and Higher Executive Grades Agreement (£2,025 to £2,230 per annum, including London allowance).

Applications stating age, qualifications, experience, present position, salary and any preference between the two posts should be sent to reach the Secretary of the Board at 46, New Broad Street, London, E.C.2, by 27th May, 1961. Ref. PER/V/3281/R. 1002

## **LANCASHIRE DYNAMO NEVELIN LTD.**

Hurst Green, Oxted, Surrey

## **MANUFACTURERS OF POWER RECTIFIERS AND SWITCHGEAR**

require

## **SENIOR AND JUNIOR DESIGN ENGINEERS**

Senior applicants should possess H.N.C. (electrical) or equivalent and have experience of power and mercury arc rectifiers, variable speed drives and associated control gear.

Junior applicants should possess O.N.C. (electrical) or equivalent. Some experience of power and mercury arc rectifiers preferable but not essential.

Salaries offered will be commensurate with qualification and experience.

The company operates a Staff pension scheme and canteen facilities are available.

Applications, in writing, should be sent to Personnel Manager, quoting reference ENG/MCC.

971

## **SENIOR MECHANICAL ENGINEER**

### **Research and Development**

APPLICATIONS are invited for the above appointment in the Research and Development Department of the Midlands Region of the Central Electricity Generating Board.

The successful applicant will be required to lead a new section responsible for mechanical engineering research in connection with very large turbo-alternators, boilers and auxiliary plant. All phases of research work are involved, including initial studies, planning and execution of experimental work, and analysis and reporting of results. Much of the work will entail collaboration with operating and maintenance staff, design engineers and specialists in other branches of applied science.

Candidates must have a good engineering degree or its equivalent, sound practical experience of heavy mechanical engineering plant, and experience of associated design or research work. Corporate Membership of a senior professional institution would be an advantage. Energy and organising ability are essential for this post.

Special knowledge of any of the following would be an advantage:—

Mechanical vibration.  
Automatic feedback control.  
Thermodynamics.  
Heat transfer.  
Mechanics of fluids.

The conditions of service are those relating to the N.J.B. Agreement and the commencing salary will be at a stage within Grades 1, 2 or 3 (Class CX, £1,570 per annum to £2,395 per annum). The point of entry will depend upon experience, qualifications and ability.

Applications in writing, quoting Vacancy No. MR/160, to the Assistant Regional Secretary (Personnel), 53, Wake Green Road, Moseley, Birmingham, 13, to arrive not later than Friday, 26th May, 1961. 988

## **CENTRAL ELECTRICITY GENERATING BOARD**

APPLICATIONS are invited for the post of  
**SENIOR ASSISTANT ENGINEER**  
(Technical)

in the Operational Efficiency Branch of the Operations Department at Buchanan House, London, E.C.1. The duties will require the application of engineering knowledge and experience to the development and improvement of methods available for monitoring the economic operation of the Board's system and other aspects of performance which contribute to it. This will involve the determination of suitable standards and targets and the periodical review of established methods of assessing performance.

The duties will also include the co-ordination of test results and special ad hoc investigations and will entail collaboration with other sections of the branch and liaison with other branches and departments. Candidates should hold a degree in engineering, or an equivalent qualification, and recent experience of power station operation or system operation is desirable.

Salary within scale £1,805-£2,295 per annum.

Applications stating age, qualifications, experience, present position and salary to the Appointments Officer, 24/30, Holborn, London, E.C.1, by 19th May. Envelopes should be marked "Confidential Ref. ER/84." 944



# ENGLISH ELECTRIC

## AIRCRAFT EQUIPMENT DIVISION

A newly formed design office in LONDON requires several experienced

# ELECTRICAL MACHINE DESIGNERS

to join a team working on the design and development of aircraft electrical equipment and systems. The team will be backed up by extensive Laboratory facilities at the Works and also by computing facilities in London.

Applicants should be qualified Engineers and have had previous machine design experience, preferably in the field of small A.C. and D.C. machines (5 watts to 100 kilowatts). Experience in the Aircraft or Guided Weapons field, whilst not essential, would be preferred.

Please write, giving details of qualifications and experience, to Chief Engineer, A.E.D., c/o Dept. G.P.S., English Electric House, Strand, London, W.C.2, quoting reference ER 296 C.

910

### MIDDLESEX COUNTY COUNCIL EDUCATION COMMITTEE

Willesden Technical College,  
Denzil Road, Willesden, London, N.W.10  
Principal: L. L. Allen, B.Sc.(Eng.), A.K.C.,  
M.I.Mech.E., M.I.E.E., M.I.Prod.E.

#### Department of Electrical Engineering

APPLICATIONS are invited for the following posts:—

#### TWO LECTURERS IN ELECTRICAL ENGINEERING.

Candidates should be graduates with good industrial or research experience and able to teach to post-Higher National Certificate standard one or more of the following subjects:—

Electrical Engineering.  
Power Technology.  
Radio Technology.

Ability to teach Mathematics to Final Higher National Certificate standard would be an additional advantage.

#### TWO ASSISTANT LECTURERS (Grade B).

Candidates should be graduates with good industrial or research experience and able to teach Ordinary National Certificate and comparable City and Guilds subjects in Electrical Engineering.

Willesden Technical College is a large college situated within a short distance from the centre of London. Engineers interested in an academic career will be given every opportunity and encouragement to continue their studies and to take an active part in research and development projects. Continuous contact with industry is encouraged.

Salary: Assistant Grade B, within the range £828 to £1,486 per annum; Lecturer, £1,408 to £1,601 per annum.

Further particulars and application forms (foolscap s.a.e.) from the Clerk of the Governing Body, 163, Willesden Lane, London, N.W.6, to be returned within two weeks.

C. E. GURR, M.Sc., Ph.D.,  
Chief Education Officer.

912

### UNIVERSITY OF DURHAM

#### Readership in Electrical Engineering

APPLICATIONS are invited for a Readership in Electrical Engineering tenable in the Newcastle Division of the University from candidates with special interests in either Electrical Machine or Electrical Power studies. This is a newly established post and candidates will be asked to take up duty on 1st January, 1962, or such other date as may be arranged.

Salary in accordance with scale (£2,025-£2,425 a year), with family allowance and membership of F.S.S.U.

Further particulars may be obtained from the undersigned, with whom applications (12 copies) must be lodged not later than 30th June, 1961. (Candidates outside the British Isles may submit one copy only.)

E. M. BETTENSON,

University Office, Registrar.  
46, North Bailey, Durham. 975

### METROPOLITAN POLICE

ASSISTANT MECHANICAL and/or ELECTRICAL ENGINEERS required for design, construction and maintenance of installations in Police Stations, Magistrates' Courts, Hostels, Wireless Stations, etc.

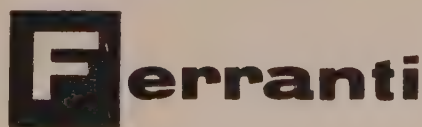
Salary according to age, within the scale of £991 (at age 25) to £1,490 (max.). Maximum starting pay £1,318 at age 34.

Non-contributory superannuation scheme, generous sick leave, five-day week, 22 days' annual leave. Prospects of promotion to higher posts.

Qualifications: Graduate or Corporate Membership of the I.Mech.E. or I.E.E., or equivalent.

Applicants who anticipate obtaining corporate membership of either of the above institutions in the near future would be considered.

Apply to the Chief Clerk, Engineering Department, Receiver's Office, New Scotland Yard, London, S.W.1. 913



have a vacancy for an

## ESTIMATING ENGINEER

in their Power Transformer Dept. at Hollinwood

Candidates should possess at least H.N.C. in Elect. or Mech. Engineering, have served an engineering apprenticeship and preferably had experience in the electrical industry with particular reference to supply equipment.

The appointment offers the opportunity of individual responsibility with an important manufacturer, an attractive salary and good pension benefits.

Application forms can be obtained from

T. J. Lunt, Staff Manager  
Ferranti Ltd.

Hollinwood, Lancs.

Please quote reference T.E.

940



**Situations Vacant (continued)****SOUTH WESTERN ELECTRICITY BOARD**

**FOURTH ASSISTANT DISTRICT ENGINEER (Transport), Torbay.**  
Salary within Class G, Grade 11, Salary Scale 5, £825 to £940 per annum of the N.J.B. Agreement.

The successful candidate will be responsible to the District Engineer for the general supervision, administration and allocation of the transport fleet of more than 100 vehicles. Duties will include the maintenance of fleet records and District repair and maintenance schedules in accordance with Board policy; preparation of vehicle replacement and additional programmes, and capital sanctions in this connection; the hiring of vehicles and other mechanical equipment; analysis of vehicle costs; the submission of appropriate records and returns; and ensuring that the Road Traffic Acts and the detailed application of the Board's transport policy are observed.

He will also supervise the Torquay vehicle maintenance depot, which may subsequently be developed, and be responsible for the efficient maintenance of the vehicle fleet.

Experience in the operation and maintenance of a large transport fleet is desirable and the possession of an appropriate qualification relating to motor engineering would be an advantage.

**FOURTH ASSISTANT DISTRICT ENGINEER (Surveyor), Torbay.**

Salary within Class G, Grade 11, Salary Scale 5, £825 to £940 per annum of the N.J.B. Agreement.

The successful applicant will be required to take charge of all survey work in the Torbay District and operate under the Planning Engineer. Duties will include the making of surveys for overhead lines and the supervision of draughtsmen engaged on the preparation of profile drawings; he may also be required to discuss with landowners and tenants the routing of mains over their properties.

The ability to use a theodolite and dumpy level is essential and the possession of a recognised surveying qualification, together with experience of overhead line work, will be an advantage. Possession of a current driving licence is desirable.

Applications for these posts to be made on standard form AE6/ACT OBTAINABLE BY POSTCARD ONLY from the District Manager, South Western Electricity Board, Union Street, Torquay. Closing date for receipt of completed applications is 29th May, 1961. 997

**ELECTRICAL DRAUGHTSMEN**

**SENIOR ELECTRICAL DRAUGHTSMEN** urgently required for central engineering and plant construction department of integrated iron and steel manufacturing company.

Experience in iron and steel industry preferred, though not essential. Salaries commensurate with experience.

Applications stating age, experience and qualifications to:—

**Chief Electrical Engineer**  
**DORMAN LONG (STEEL) LTD.**  
G.P.O. Box 11  
Royal Exchange, Middlesbrough 924

**NORTH EASTERN ELECTRICITY BOARD**

**APPLICATIONS** are invited for the following appointments which are subject to the conditions of the National Joint Council (Administrative and Clerical Grades) Agreement for the Electricity Supply Industry.

**Wear Sub-Area**

- (a) **SENIOR DEMONSTRATOR**, Sunderland.  
Salary Grade 2, £700/£775 per annum.  
(b) **DEMONSTRATOR**, Sunderland.  
Salary Grade 1, £600/£700 per annum.

Applicants should have a certificate of a recognised domestic science training college and/or E.A.W. Certificate, preferably the latter; also considerable experience in the electricity supply industry as a Demonstrator for post (a) and as a Demonstrator or Assistant Demonstrator for post (b).

Applications stating age, qualifications and experience to be received by Assistant Secretary (Establishments), North Eastern Electricity Board, G.P.O. Box No. 117, Carlisle House, Newcastle upon Tyne, 1, within ten days of the appearance of this advertisement. 993

**ELECTRICAL DESIGNERS & DRAUGHTSMEN**

required

Salary on appointment up to

**£1,450 p.a.**

Applicants must be fully experienced on lighting and power supply for industrial installations.

**GOOD PROSPECTS** • **PENSION SCHEME**  
**5-DAY WEEK** • **LUNCHEON VOUCHERS**

Full details, please, in confidence to Box 942.

**CENTRAL ELECTRICITY GENERATING BOARD****West Midlands Division**

**OPERATION SUPERINTENDENT** is required at Stourport "A" and "B" Power Stations. N.J.B. service conditions, superannuable appointment, salary within Schedule A, Grade K.4, £1,650-£1,830.

Applicants should have received a sound technical and practical training, and should have considerable experience in the operation and maintenance problems arising in a large modern power station. The possession of a recognised technical qualification will be an advantage.

Apply, quoting Vacancy Number 133/61 MD, on form AE6 available from the Station Superintendent, Stourport Power Station, Severn Side, Stourport-on-Severn, Worcs., by 23rd May, 1961. 989

**MERSEYSIDE AND NORTH WALES ELECTRICITY BOARD**

**ASSISTANT CONSUMERS' ENGINEER** (2) required in the Liverpool North District of the Board's No. 1 Sub-Area. Salary within range £765/£870 per annum (N.J.B. J/14).

Applicants should have completed a recognised electrical apprenticeship, and some technical training will be an advantage. Duties will include estimating and preparation of specifications for contracting work, and advising consumers on matters relating to electricity supply and the utilisation of electrical equipment.

Appointments subject to medical examination. Pension scheme.

Standard application forms, obtainable from the Manager, No. 1 Sub-Area, 24, Hatton Garden, Liverpool 3, should be returned not later than 26th May, 1961. 995

**CITY OF SHEFFIELD EDUCATION COMMITTEE****College of Technology****Department of Engineering**

**APPLICATIONS** are invited for the following posts, duties to commence at latest in September, 1961:—

(a) **SENIOR LECTURER IN CONTROL ENGINEERING AND ELECTRONICS** to teach in Higher National Diploma and Certificate courses, to promote the teaching of these subjects, to develop new laboratories now being erected, to organise special postgraduate courses and to initiate research. Interest in the teaching and experimental work of Statistics, Quality Control and Operational Research will be welcomed.

(b) **SENIOR LECTURER IN THE ENGINEERING OF PRODUCTION** to teach a reasonable selection from Machine Tools, Metrology, Principles of Engineering Production and Production Processes, to assist in the development of the Higher National Diploma and Certificate courses, to promote research in Machining and Metrology, to organise postgraduate courses and to exploit the full possibilities of the existing Machine Tool and Metrology Laboratories and the Mechanical Deformation Laboratory now in course of construction. Interest in automatic control devices will be welcomed.

(c) **LECTURER IN MECHANICAL ENGINEERING** with specialist knowledge of heat utilisation and thermodynamics, to teach in Higher National Diploma and Certificate courses a reasonable selection from Applied Heat, Applied Mechanics (S.3 and A.1), Mathematics, Strength of Materials and Theory of Machines. Interest in and knowledge of plant engineering will be welcomed.

Applicants for these posts should hold graduate qualifications, be corporate members of an engineering institution and have had adequate responsible experience in industry. Ability to teach is essential.

**Salary scales:—**

Senior Lecturer, £1,550 × £50 to £1,750 p.a.  
Lecturer, £1,370 × £35 to £1,550 p.a.

Application forms, obtainable with further particulars and a prospectus of the Department from the undersigned (s.a.e.) at P.O. Box 67, Sheffield, 1, should be returned within 14 days of the appearance of this advertisement.

T. H. TUNN,  
Director of Education. 927

**MERSEYSIDE AND NORTH WALES ELECTRICITY BOARD**

**APPLICATIONS** are invited for the following appointments at No. 3 Sub-Area Headquarters, Chester:—

**THIRD ASSISTANT ENGINEER**

(Construction).

Applicants must have had experience of the laying of H.V. and M.V. underground cables, the erection of H.V. and M.V. overhead lines and the erection of substations.

**THIRD ASSISTANT ENGINEER**

(Planning and Development).

Applicants must have had experience in all aspects of the distribution of electricity and knowledge of the technical and economic principles underlying the design of distribution networks.

Salary for both posts will be £1,115/£1,245 per annum (N.J.B. K/10, Grade 9).

Applicants should possess suitable technical qualifications.

Appointments subject to medical examination. Pension scheme.

Applications, on forms obtainable from the Manager, No. 3 Sub-Area, Electricity House, Newgate Street, Chester, must be forwarded not later than the 26th May, 1961. 996

**ELECTRICAL AND MECHANICAL DESIGNERS AND DRAUGHTSMEN**

required at London Bridge offices on all types of industrial installations. Salary £1,500 p.a. for senior design staff.

Write giving details of age, exp. and qualifications to D. & S. Engineering (Kent) Ltd., 103, Borough High Street, London, S.E.1. 8256



**EAST MIDLANDS ELECTRICITY BOARD**

APPLICATIONS are invited from suitably qualified and experienced persons for the following appointments. Applicants should state age, qualifications, experience, etc., and quote the appropriate vacancy number.

**Lincolnshire Sub-Area****PRINCIPAL ASSISTANT  
(SECRETARIAL)**

(Vacancy No. 49/61).

Salary N.J.C. Grade 7, £1,250 × £35 to £1,355 per annum.

The successful applicant will be responsible to the Sub-Area Secretary for the general administrative work of the Secretarial Department, including statutory consents procedure, insurances, estates and wayleaves, legal matters, personnel and welfare, civil defence, committee service, capital authorisation and purchasing procedure.

Candidates should have extensive experience of general administrative and secretarial work and should possess an appropriate qualification.

Applications should be forwarded to the Manager, Lincolnshire Sub-Area, North House, Grantham, Lincolnshire, not later than the 25th May, 1961.

**Northamptonshire Sub-Area****FIRST ASSISTANT DISTRICT  
COMMERCIAL ENGINEER,  
BLETCHLEY DISTRICT**

(Vacancy No. 50/61).

Salary N.J.B. Class F, Grade 5, £1,190 to £1,325 per annum.

The person appointed will assist the District Commercial Engineer in the supervision of the District commercial activities. The duties will also include negotiations for the supply of electricity to agricultural, commercial and industrial consumers.

Candidates should have a sound knowledge of the electricity supply industry, together with good technical and commercial experience.

Applications should be forwarded to the Manager, Bletchley District, Victoria Road, Bletchley, Buckinghamshire, not later than the 25th May, 1961.

**Area Board Headquarters****SENIOR ASSISTANT**

(Organisation and Methods)

(Vacancy No. 53/61).

Salary N.J.C. Grade 5, £1,020 × £30 to £1,140 per annum.

Applicants should have a good background knowledge of this industry and a professional qualification is desirable.

Previous experience in organisation and methods is not essential. Training will be given.

Applications should be forwarded to the Secretary, East Midlands Electricity Board, Mapperley Hall, Lucknow Avenue, Nottingham, not later than the 25th May, 1961.

962

**ENGLISH ELECTRIC  
STAFFORD**

require

**SALES ENGINEERS**

to prepare tenders and specifications.

**CONTRACTS ENGINEERS**

to handle comprehensive contracts throughout the design, manufacture and commissioning stages for all aspects of power generation and distribution; together with its application to a wide variety of industrial processes.

Vacancies exist both for engineers with previous experience of these functions, and also for recently qualified Degree and H.N.C. (Elec.) men who have completed a relevant apprenticeship and who wish to enter the commercial field.

These posts are permanent and pensionable and housing and removal assistance can be given where required.

Write, giving full particulars to the Technical Staff Officer, Dept. C.P.S., English Electric House, Strand, London, W.C.2, quoting reference ER1297Q.

911

**HUNTINGDONSHIRE  
COUNTY ARCHITECT'S DEPARTMENT****Technical Assistant (Electrical Engineer)**

APPLICATIONS are invited for the above appointment on Grade A.P.T. 3 (£960-£1,140) or Grade A.P.T. 4 (£1,140-£1,310) according to qualifications.

The person appointed will be a member of the Engineering Section of the Department, and his duties will consist of all works connected with electrical installations related to both small and large building projects. Preference will be given to candidates studying for or actually holding the A.M.I.E.E. and the person appointed can anticipate work in connection with major electrical installations.

Application forms may be obtained from the County Architect, County Buildings, Huntingdon, and completed forms should be returned to the undersigned by Monday, 29th May, 1961.

A. C. AYLWARD,

Clerk of the County Council.

County Buildings,  
Huntingdon.

955

**CENTRAL ELECTRICITY  
GENERATING BOARD****North Eastern and Yorkshire Region****Fourth Assistant Engineer,  
Transmission Department, Keadby**

APPLICATIONS are invited for the appointment as a FOURTH ASSISTANT ENGINEER, Keadby Transmission Section, near Scunthorpe.

Applicants should preferably have had some experience of the maintenance and operation of high-voltage (132 kV and above) transmission systems and technical qualifications to Higher National Certificate standard.

The successful applicant will be required to reside in the Keadby/Scunthorpe locality.

The salary for the appointment will be in accordance with Grade 11 BX, Schedule B of the National Joint Board Agreement £855-£1,165 per annum) and will commence at a point commensurate with qualifications and experience.

Forms of application may be obtained from the Assistant Regional Secretary (Personnel), Central Electricity Generating Board, North Eastern and Yorkshire Region, 1, Whitehall Road, Leeds, 1, to whom they should be returned to arrive not later than the 23rd May, 1961.

981

**LONDON ELECTRICITY BOARD****Senior Sales Representative**

APPLICATIONS are invited for the above position in the Commercial Department of the Board's Surrey Suburban District. The successful applicant will be based at Electricity House, Durnsford Road, Wimbledon, London, S.W.19, but will be required to work anywhere in the District, and may from time to time be called upon to undertake duties in the show-rooms.

Applicants should be capable of carrying out an energetic sales policy and be thoroughly conversant with supply matters, tariffs, apparatus and sales to consumers with domestic or small commercial or industrial installations. The possession of the E.D.A. Salesmanship Certificate would be considered an advantage. They should be competent to lead a small team of representatives.

The post is graded within the National Joint Council Agreement (Administrative and Clerical Grades) as Grade 3, i.e., £780 to £880 per annum, plus the appropriate London area allowance.

Applications should be sent direct to the Manager at the above address, within ten days of the publication date of this notice. Please quote ref. PER/V/3278/R.

928

**E.D.A. TESTING HOUSE — LEATHERHEAD SURREY**

Vacancies exist for those experienced in the testing of:

**DOMESTIC ELECTRICAL APPLIANCES**

OR

**ELECTRO-MECHANICAL DEVICES**

The modern and well equipped laboratories of E.D.A. undertake detailed and comprehensive approval tests on domestic appliances for the British Electrical Approvals Board, the British Standards Institution and the Electricity Boards. To meet additional demands these laboratories are being substantially extended and excellent opportunities are now available for those with the right experience.

Vacancies exist in all grades, with salary scales up to a maximum of £1,245 per annum according to qualifications and experience. Good conditions of service include contributory pension scheme, free life insurance, five day week, luncheon facilities, etc. In addition, financial assistance in cases where suitable candidates are faced with housing difficulties.

Apply giving full details of qualifications and experience to the

DIRECTOR AND SECRETARY

**ELECTRICAL DEVELOPMENT ASSOCIATION**

2 SAVOY HILL, LONDON, W.C.2

909



**Situations Vacant (continued)****SOUTH EASTERN ELECTRICITY BOARD****ASSISTANT DISTRICT ENGINEER,  
CROYDON AND PURLEY DISTRICT.**

Salary £1,325 to £1,460 per annum, including London allowance under N.J.B. Agreement, Class J, Grade 7. Superannuable.

Applicants should be suitably qualified and have responsible experience in construction work up to 11 kV. Candidates should also have experience in planning of distribution systems and maintenance work up to the same voltage.

Applications, quoting ER and naming two referees, on forms from District Manager, SEEBOARD, Electric House, Wellesley Road, Croydon, by 24th May, 1961.

**ASSISTANT DISTRICT ENGINEER,  
CROYDON AND PURLEY DISTRICT.**

Salary £1,165-£1,295 per annum, including London allowance under N.J.B. Agreement, Class J, Grade 9. Superannuable.

Applicants should be suitably qualified and have operational experience of maintenance and construction on distribution systems up to 11 kV. Candidates should also have experience of planning work.

Applications, quoting ER and naming two referees, on forms from District Manager, SEEBOARD, Electric House, Wellesley Road, Croydon, by 24th May, 1961.

**ASSISTANT DISTRICT ENGINEER,  
SEVENOAKS AND REIGATE  
DISTRICT.**

Salary £965 to £1,090 per annum under N.J.B. Agreement, Class G, Grade 9, according to qualifications, experience and ability.

Applicants should be suitably qualified and have training and experience in the construction, operation and maintenance of underground and overhead distribution systems up to 11 kV.

The successful candidate will operate from District Office, Oxted, but duties will cover any point within the district.

Applications, quoting ER and naming two referees, to District Manager, SEEBOARD, Electric House, West Hill, Oxted, Surrey, by 24th May, 1961.

**ASSISTANT DISTRICT ENGINEER,  
LEWES DISTRICT.**

Salary £965 to £1,090 per annum under N.J.B. Agreement, Class E, Grade 7. Superannuable.

Applicants should be suitably qualified and have had training and experience in the construction, operation and maintenance of underground and overhead distribution systems.

Applications, quoting ER and naming two referees, to District Manager, SEEBOARD, 80/81, High Street, Lewes, by 24th May, 1961.

**SHOWROOM SUPERVISOR,  
TWICKENHAM AND RICHMOND  
DISTRICT.**

Salary £890 × £30 to £1,010 p.a. plus London weighting, under N.J.C. Grade 4. Superannuable.

Applicants should have experience in the supervision of staff, sound knowledge of showroom procedure, sales promotion, display techniques and the application of the Board's tariffs. Possession of the E.D.A. Salesmanship qualification is desirable. The successful applicant will normally be employed in the Twickenham showroom but will, if necessary, be required to work elsewhere within the Twickenham and Richmond District.

Applications, quoting ER on forms from District Manager, SEEBOARD, 42, York Street, Twickenham, Middlesex, by 24th May, 1961.

5th May, 1961. **GEORGE WRAY,**  
Secretary.

1000

**BRITISH JEFFREY-DIAMOND LTD.****Stennard Works, Wakefield**

require the services of an experienced  
**A.C. MOTOR DESIGNER**

for heavy-duty motors for use in the mining industry. Both electrical and mechanical design is involved and this senior position offers interesting possibilities in an established and expanding organisation.

Apply in writing to the Secretary, stating age, experience and qualifications.

1008

**RICHARD THOMAS & BALDWIN LIMITED  
SPENCER WORKS**

have the following vacancies in the electrical engineering department at the integrated iron and steel plant now under construction at Llanwern, near Newport, Mon.

**HOT MILL  
PLANT ENGINEER**

To take charge of the maintenance of a modern high-speed hot-strip mill and universal slabbing mill. Advanced techniques will be incorporated in this plant and applicants should have had previous experience with rolling mills or similar drives.

They should be corporate members of the I.E.E. or have held a post that has led to their gaining exceptional experience in this field.

Please quote Ref. No. 202/25

**COLD MILL  
PLANT ELECTRICAL ENGINEER**

To take charge of the maintenance of a mill which will include a 4-stand cold reduction mill, temper mills, and several process lines. Applicants should have had previous experience with this type of equipment and should be corporate members of the I.E.E. or have held a post that has led to their gaining exceptional experience in this field.

Please quote Ref. No. 202/35

Both of these are senior posts. Age range 30-50.

Application forms, which should be returned by 19th May, 1961, can be obtained from:

The Manager, Staff and Labour Relations Department  
**RICHARD THOMAS & BALDWIN LIMITED**  
Spencer Works, Llanwern, Nr. Newport, Mon.

938

**FEDERAL GOVERNMENT  
OF NIGERIA****ELECTRICAL ENGINEER**

**E**LECTRICAL Engineers are required for the Works Division of the Federal Ministry of Works and Surveys to design, supervise and maintain electrical installations in Government buildings, hospitals, staff quarters, etc., and to investigate and apply modern forms of wiring to tropical conditions.

Candidates must possess a University Degree in Electrical Engineering or Associate Membership of the Institution of Electrical Engineers or exemption from Parts I, II and III of the Examination of the Institution of Electrical Engineers, with postgraduate experience of at least two years' duration with an electrical installation contractor, public works department or a local government building department. They should preferably have had experience of electrical installation work in large buildings, including the design, estimation, contract procedure, inspection and testing. Applicants must be between the ages of 25 and 50 years.

Appointment on contract for one tour of 12 to 18 months in the first instance. Salary, according to age and experience, £1,434 to £2,196 p.a. (including inducement addition) plus gratuity of £150 p.a. for satisfactory service. An outfit allowance of £60 is paid on salaries up to £1,740 p.a. inclusive. Free passages for officer and wife. Children's allowances whilst separated. Home leave on full pay. Income tax at low local rate. Rent at low cost.

Candidates should write for application forms, stating age, qualifications and experience, to the Recruitment Attaché, Office of the High Commissioner, Nigeria House, 9, Northumberland Avenue, London, W.C.2, quoting V.12/2.

1012

**LONDON ELECTRICITY BOARD****Engineering Draughtsman**

**A**PPPLICATIONS are invited for the above position in the Board's Southern District, 54, Bengeworth Road, London, S.E.5.

Candidates should have a good general and technical education and be in possession of the Ordinary National Certificate, be neat and capable draughtsmen, and be experienced in one or more of the following subjects: drawing office routine, electrical diagrams, layout of plant in transformer chambers, mains survey and recording of mains work. A knowledge of building construction would be an advantage.

The post is graded under Schedule A of the National Joint Board Agreement as Class H, Grade 13, £815 to £920 per annum, inclusive of London allowance.

Application form obtainable from the Personnel Officer, 46, New Broad Street, London, E.C.2. Please quote ref. PER/V/3242/R.

1003

**TECHNICAL SALES  
REPRESENTATIVES**

**MAWDSLEY'S LIMITED**  
Dursley, Glos.

**M**AKERS of special-purpose rotating electrical machinery with wide and varied applications require technically qualified (Degree or H.N.C.) Sales Representatives in the West Midlands centred on Birmingham, East Midlands centred on Leicester, and in the London area.

Experience in design or manufacture of the company's type of product and related sales experience are essential qualifications.

Salaries will be negotiated. A pensions and life assurance scheme is in operation.

Applications will be treated in absolute confidence and should be addressed to the Managing Director, giving a full summary of career and training.

925





Brush Electrical Engineering Company Limited

(A member of the Hawker Siddeley Group — Industrial Division)

Due to recent promotions and expansion, we are looking for keen and energetic men with initiative for appointments in our SALES DIVISION as:—

## SENIOR COMMERCIAL ENGINEER (Rotating Electrical Machines)

### CONTRACT ENGINEERS

### TENDERING ENGINEERS

for Rotating Electrical Machines  
and  
Switchgear

Candidates should have H.N.C. (Electrical) or equivalent and be experienced in Tendering and/or Contract work for electrical equipment. A good record of past achievements in this field may outweigh the need for H.N.C. qualifications. Salary will be commensurate with qualifications and experience.

The Company is situated in a small town on the edge of Charnwood Forest. Extensive housing development is taking place and excellent educational facilities of all grades are available.

Applications, WHICH WILL BE TREATED IN THE STRICTEST CONFIDENCE, should give details of your career to date and be sent to Mr. A. Garner, Brush Electrical Engineering Company Limited, Loughborough, Leicestershire, quoting reference: PL.9939.

953

#### EASTERN ELECTRICITY BOARD

APPLICATIONS are invited for the following appointments. The successful applicants will be required to contribute to a superannuation scheme and may be required to undergo a medical examination.

##### Northmet Sub-Area

#### ENFIELD DISTRICT GENERAL ASSISTANT ENGINEER

(Ref. 1064) (109/61.R).

Candidates should have had a good general and technical education and possess Higher National Certificate or equivalent qualification. Salary N.J.B. Class G, Grade 13 (£715-£805), plus London allowance.

Apply by letter to A. T. Durbridge, Manager, Eastern Electricity Board, 40, Church Street, Enfield, Middlesex, by 15th May, 1961.

#### TOTTENHAM DISTRICT SECOND ASSISTANT ENGINEER

(Ref. 1051) (110/61.R).

Candidates should have had a sound technical training and considerable experience in the construction, operation and maintenance of underground distribution systems at voltages up to and including 33 kV.

Salary N.J.B. Class F, Grade 7 (£1,040-£1,165), plus London allowance.

Apply by letter to J. A. K. Bowerman, A.M.I.E.E., Manager, Eastern Electricity Board, Tottenham District, 312, High Road, Tottenham, London, N.15, by 22nd May, 1961.

##### Chilterns Sub-Area

#### LUTON DISTRICT GENERAL ASSISTANT ENGINEER

(Commercial) (108/61.N).

The successful candidate will be required to assist in the preparation of schemes for street lighting and quotations for off peak heating schemes.

Salary N.J.B. Class J, Grade 15 (£715-£805).

Possession of the appropriate technical qualifications and the completion of a recognised apprenticeship would be an advantage.

Apply by letter to the Manager, Luton District, Eastern Electricity Board, 487, Dunstable Road, Luton, Beds., by 26th May, 1961. 984

#### SOUTH WALES ELECTRICITY BOARD

##### District Chief Clerk, Swansea

APPLICATIONS are invited for the position of DISTRICT CHIEF CLERK in the Swansea District of the Swansea and West Central Area. The successful applicant will be required to take charge of the District Clerical Organisation (staff of approximately 50).

He will be responsible for the accountancy work in the District and the provision of clerical services to the Engineering and Commercial Departments. Preference will be given to candidates possessing a suitable professional qualification.

Salary N.J.C. Grade 7, £1,250/£1,355 per annum.

Applications stating age, present position, present salary, qualifications and experience should be addressed to G. R. T. Edwards, B.Sc., M.I.E.E., M.Am.I.E.E., Manager, Swansea and West Central Area, 29, Ystrad Road, Swansea Industrial Estate, Swansea, so as to arrive not later than 27th May, 1961. Envelopes should be endorsed "D.C.C. 57/61."

R. G. WILLIAMS,

Secretary. 998

#### ELECTRIC MOTOR REPAIRS

A MIDLAND company operating a large electrical and general engineering repair works requires an experienced and determined engineer to manage the routine operation of the department. The successful applicant would be directly responsible to the director in charge of repairs.

Experience in a wide range of electrical repairs is essential and manufacturing experience would be an advantage. In this industry the working hours must essentially be erratic and applicants must realise this. It is intended to appoint someone in the age range 32-40 years.

An attractive salary commensurate with experience and willingness to undertake responsibility will be paid. Assistance with housing available.—Box 1004.

#### CENTRAL ELECTRICITY GENERATING BOARD

##### South Western Division

INSTRUMENT MECHANIC (Vacancy No. ER/AV/45/61) required at Plymouth "B" Generating Station.

N.J.I.C. conditions of service, rate of pay 5s. 6½d. per hour, 42-hour, 5-day week.

The appointment offers an opportunity for an experienced Instrument Mechanic who wishes to work on modern plant with the latest equipment. The duties include maintenance of boiler house and turbine house instruments, automatic controls, pneumatic and electronic equipment. Training will be given in specialised equipment.

The appointment may also be an opportunity for a young man who has recently completed his apprenticeship and wishes to gain experience on modern power station instruments.

The person appointed can be considered for housing accommodation.

Applications in writing should be addressed to the Station Superintendent, Plymouth "B" Generating Station, Prince Rock, Plymouth, Devon, to be received by not later than 22nd May, 1961.

THIRD ASSISTANT ENGINEER (Vacancy No. ER/AV/46/61) required in the System Operation Department, Near Bristol.

Superannuation scheme. Salary N.J.B. Class BX, Grade 6, Scale 13, £1,285-£1,610 per annum.

Duties include long term forecasting of plant and load, units generated, etc., and generally assisting with the day-to-day arrangements associated with the grid control room.

Applicants should have a good general and technical education, preferably leading to I.E.E. Membership and should be interested in organisation. Power station experience will be an advantage.

Applications on form A.E.6/ACT obtainable from the Divisional Secretary, 26, Oakfield Road, Bristol, 8, should be completed and returned by 22nd May, 1961. 992

#### CENTRAL ELECTRICITY GENERATING BOARD

##### West Midlands Division

Assistant Engineer (Instruments) at Hams Hall "A" "B" "C" Power Stations

APPLICATIONS are invited from suitably qualified engineers for the above post.

The successful candidate will be responsible to the Site Instrument Engineer for the maintenance of the instrumentation, automatic boiler control and associated equipment at the Hams Hall Group of Stations.

Salary within Schedule A, Grade N.10 of the N.J.B. Agreement, i.e. £1,350 to £1,500 per annum, superannuable appointment.

Apply, quoting Vacancy Number 132/61, on form AE6 available from the Station Superintendent, Hams Hall Power Station Site, Lea Marston, Sutton Coldfield, Warwickshire, by 29th May, 1961. 990



## SENIOR SALES ENGINEER

A Senior Sales Engineer is required by Johnson & Phillips Limited to promote the sale of the Company's products to major industrial concerns, and also through Consulting Engineers. He will probably be between 30 and 35 years of age and preferably a Corporate Member of the Institution of Electrical Engineers. In addition, he should have some sales experience and a technical knowledge of electrical distribution equipment. The post will be based upon the London Branch of the Company and applications giving preliminary details should be sent to the Employment Manager, Johnson & Phillips Limited, Charlton, S.E.7.

973



**Situations Vacant (continued)**

**CENTRAL ELECTRICITY  
GENERATING BOARD**

**East Midlands Division**

**ASSISTANT MAINTENANCE  
ENGINEER (Mechanical),  
SPONDON POWER STATION  
(Vacancy No. 91/61).**

Applications are invited for the position of Assistant Maintenance Engineer (Mechanical) at the Spondon Power Station, Thulston Road, Borrowash, Near Derby.

Applicants should have received a sound technical training and wide practical experience in the maintenance of power station mechanical plant, particularly turbo alternators, and must be capable of planning and supervising mechanical plant maintenance.

Preference will be given to candidates who are corporate members of an appropriate professional institution or hold qualifications leading to such membership.

The salary will be in accordance with Class J, Grade 8 (£1,190-£1,325 per annum) of the National Joint Board Agreement.

Closing date for receipt of applications, 19th May, 1961.

**ASSISTANT ENGINEERS (Relief),  
COVENTRY POWER STATION  
(Vacancy No. 92/61).**

Applications are invited for the positions of Assistant Engineers (Relief) at Coventry Power Station, Alderman's Green, Coventry.

Applicants should have received a sound electrical training and have had experience in the operation of boiler and turbine plant. Preference will be given to candidates who possess the Higher National Certificate in Mechanical or Electrical Engineering, or who are at present pursuing a course of study with the object of obtaining this or a similar qualification.

Salary will be in accordance with Class G, Grade 12 (£765-£870 per annum) of the National Joint Board Agreement, plus £90 per annum allowance whilst engaged on shift duties.

Closing date for receipt of applications, 19th May, 1961.

**ASSISTANT SHIFT CHARGE  
ENGINEER,  
LEICESTER POWER STATION  
(Vacancy No. 99/61).**

Applications are invited for the position of Assistant Shift Charge Engineer at Leicester Power Station, Rawdykes Road, Leicester.

Applicants should have received a sound technical training and have had experience in a modern power station. Preference will be given to candidates who possess the Higher National Certificate or its equivalent.

Salary will be in accordance with Class G, Grade 9 (£965-£1,090 per annum) of the National Joint Board Agreement, plus 10% allowance for shift duties.

Closing date for receipt of applications, 19th May, 1961.

The appointments will be pensionable within the terms and conditions of the Electricity Supply (Staff) Superannuation Scheme.

Applications should be submitted on the official form AE6/ACT which may be obtained from the Station Superintendent concerned and should be returned to him by the date stated.

O. S. WOODS,  
Divisional Controller.

991

**TRANSFORMERS**

**INTERMEDIATE AND JUNIOR  
DRAUGHTSMEN** required with some experience on power transformers in range 10-30,000 kVA. Permanent positions carrying excellent salaries according to experience.

Contributory pension and life assurance scheme in operation and canteen facilities provided.

Evening and Saturday interview can be arranged.

Write stating age, experience and education to:—

**Chief Draughtsman**

**BRYCE ELECTRIC CONSTRUCTION  
CO. LTD.**

**Kelvin Works, Hackbridge, Surrey**

808

**ADMIRALTY - NAVY WORKS DEPARTMENT  
ELECTRICAL AND MECHANICAL  
ENGINEERING DRAUGHTSMEN**

Vacancies exist in Navy Works Department Drawing Offices at the following Establishments:—Pinner (Middlesex), London, Chatham, Portsmouth, Portland, Devonport, Milford Haven, Liverpool and Rosyth and occur elsewhere in the United Kingdom from time to time.

The posts are non-pensionable but there will be opportunities for transfer to the Established Staff. Applicants must be competent Draughtsmen and experienced in one or more of the following types of work:—

**ELECTRICAL**

- (a) Preparation of specifications, drawings and schedules for electrical equipment. Precise of Firms' tenders.
- (b) Electrical installations in domestic and industrial buildings.
- (c) Cable installations, switchgear, etc.
- (d) Airfield lighting.
- (e) Low Tension Power Distribution Systems and Telecommunications Wiring.

**MECHANICAL**

- (a) Preparation of specifications, drawings, schedules for Mechanical Equipment. Precise of Firms' tenders.
- (b) District heating, including boiler installations, heating and air conditioning of domestic and specialist buildings.
- (c) Layouts of engineering installations and workshop machinery.
- (d) All classes of lifting appliances, pumping installations, test plants, cooking equipment, etc.

Possession of O.N.C. or similar qualification will be an advantage. Consideration will be given to successful candidates being granted assistance to obtain technical qualifications.

Salary (Men): National Rate—subject to slight variation dependent on location: starting from £603 (at age 21) to £905 (28 and over); maximum of scale—£993 p.a. (National Rate).

Opportunities occur for promotion to Leading grade—salary maximum £1,160 p.a. (National Rate).

Five-day week: annual leave 18 days rising to 22 after 10 years.

Candidates, who must be British subjects, are invited to apply in writing, giving details of qualifications and experience to Director General, Navy Works, Admiralty, Chamberlain Way, Pinner, Middlesex, quoting ref. 45/96/125.

788

**CENTRAL ELECTRICITY  
GENERATING BOARD**

**South Thames Division**

**Electrical Engineer's Department**

**THIRD ASSISTANT ENGINEER  
(Services), CROYDON DISTRICT  
(Vacancy No. 134/61).**

Candidates must possess the Higher National Certificate in Electrical Engineering or equivalent qualification and have had experience of the commissioning and maintenance of automatic protective gear and control gear of the type associated with major electrical plant in the Generating Board's power station and substations, and of investigating faults on such plant. Ability to make calculations of balanced and unbalanced fault conditions and to write a good report is also desirable.

Salary N.J.B. Class AX, Grade 8, £1,155 to £1,375 p.a., including London allowance, and subject to review.

**THIRD ASSISTANT ENGINEER  
(System Design and Planning),  
DIVISIONAL HEADQUARTERS,  
KINGSTON (Vacancy No. 135/61).**

Candidates must possess the Higher National Certificate in Electrical Engineering or equivalent qualification leading to Graduate Membership of the Institution of Electrical Engineers. An interest in and some experience of system design, load flow and fault current calculations, including the use of A.C. and D.C. network analysers, is essential.

Salary N.J.B. Class AX, Grade 6, £1,335 to £1,550 p.a., including London allowance, and subject to review.

**FOURTH ASSISTANT ENGINEER  
(Protective Gear),  
DIVISIONAL HEADQUARTERS,  
KINGSTON (Vacancy No. 136/61).**

Candidates must possess the Higher National Certificate in Electrical Engineering or equivalent qualification leading to Graduate Membership of the Institution of Electrical Engineers, and should be interested in the application and operation of automatic protective gear on a large power system. Some knowledge of fault current calculations is very desirable.

Salary N.J.B. Class AX, Grade 11, £905 to £1,140 p.a., including London allowance, and subject to review, with prospect of promotion subject to satisfactory service.

Applications giving age, details of experience, qualifications, present position, etc., and quoting vacancy number should be sent to the Personnel Officer, Central Electricity House, Lower Ham Road, Kingston-upon-Thames, Surrey, to arrive by 26th May.

983

**NORTH WESTERN ELECTRICITY BOARD**

**District Engineer,  
Central District, Manchester**

The duties will include the planning, construction, maintenance and operation of the low-voltage and high-voltage networks, including substations, records, control of transport, etc. Applicants should have had a wide general experience on the distribution side of electricity supply. Corporate Membership of the Institution of Electrical Engineers will be an advantage.

The District has a maximum demand of approximately 130 MW and supplies over 78,000 consumers in a highly concentrated industrial area.

Salary scale £1,795/£1,950 p.a., Grade J.2. N.J.B. conditions.

Applications on forms to be obtained from the Manager (Staff Vacancies), No. 1 Sub-Area, North Western Electricity Board, Town Hall, Manchester, and returned to him by 23rd May, 1961.

**District Commercial Engineer,  
Oldham District**

Duties will include the organisation and control of commercial staff and functions in the District; supply of information and advice to consumers on all commercial matters; control of contracting section, service centres and exhibitions. Corporate Membership of the Institution of Electrical Engineers will be an advantage.

Salary scale £1,650/£1,830 p.a., Grade H.2. N.J.B. conditions.

Applications on forms to be obtained from the Manager, No. 3 Sub-Area, North Western Electricity Board, Union Street, Oldham, and returned to him by 27th May, 1961.

930

**CAPACITOR  
SALES ENGINEER**

required to deal with capacitor business in Scotland. Qualifications equivalent to Higher National Certificate standard in Electrical Engineering are essential and applicants must have personality and drive necessary for sales work.

Applications should be as detailed as possible and addressed to Personnel Officer (Home Sales, Regions and Branches), British Insulated Callender's Cables Limited, 21, Bloomsbury Street, London, W.C.1.

957



# CENTRAL ELECTRICITY GENERATING BOARD

## South Eastern Region: North Thames Division

APPLICATIONS are invited for the following appointments:—

**ASSISTANT MAINTENANCE  
ENGINEER (Electrical),  
BRIMSDOWN GENERATING  
STATION (Enfield, Middlesex)**  
(S.V. 1494).

Salary N.J.B. Class K, Grade 7, Scale 12, £1,350-£1,500 per annum plus London weighting £50 per annum.

Applicants should have served an apprenticeship and obtained the O.N.C. in Electrical and/or Mechanical Engineering, and have had experience in the maintenance of the electrical plant in a large modern generating station.

**ASSISTANT SHIFT CHARGE  
ENGINEER, LITTLE BARFORD  
GENERATING STATION**  
(St. Neots, Hunts) (S.V. 1496).

Salary N.J.B. Class J, Grade 8, Scale 10, £1,190-£1,325 per annum plus 10% shift allowance.

Applicants should have served an apprenticeship and obtained a Higher National Certificate in Electrical or Mechanical Engineering or equivalent qualification. Preference will be given to applicants who have had experience in the operation of large modern units utilising pulverised fuel.

Housing accommodation may be available for the successful applicant.

**MAINTENANCE ENGINEER (Electrical),  
PETERBOROUGH GENERATING  
STATION (Northants)**  
(S.V. 1498).

Salary N.J.B. Class F, Grade 6, Scale 9, £1,115-£1,245 per annum.

Applicants should have served an apprenticeship and have had experience in the maintenance of the electrical plant in a large modern generating station.

Applicants should possess the Higher National Certificate in Electrical Engineering or equivalent qualification.

Applications, quoting the appropriate reference S.V. number, stating age, qualifications, experience and present position, should be sent to the Central Electricity Generating Board, West Farm Place, Chalk Lane, Cockfosters, Barnet, Herts., to arrive not later than 20th May, 1961. 959

## TELECOMMUNICATIONS ENGINEER, POSTS AND TELECOMMUNICATIONS DEPARTMENT, GOVERNMENT OF SIERRA LEONE

**DUTIES:** To be responsible for supervising, maintaining, installing and developing telecommunications services generally, including carrier telephony, under the direction of the Postmaster-General and the Engineer-in-Chief.

**QUALIFICATIONS:** Candidates, under 45 years, must be Corporate or Graduate Members of the Institution of Electrical Engineers; or hold a Degree or Diploma in Electrical Engineering with Telecommunications subjects. They must have a sound knowledge of theory and practical experience of telecommunications engineering generally, with ability to control and train subordinate staff particularly in carrier technique.

**TERMS OF APPOINTMENT:** Contract appointment. Salary at appropriate point in scale £1,470-£2,145 a year. Gratuity 15% of salary. Free passages and medical attendance. Rented quarters. Children's allowances. Outfit allowance. Generous leave.

Write Sierra Leone Recruiting Agency, Room 756, Sanctuary Buildings, Great Smith Street, London, S.W.1, quoting BCD.108/15/03/D11, and giving full names, age, qualifications and experience. 958

## KENT COUNTY COUNCIL

**ELECTRICAL ENGINEERING ASSISTANTS** required with experience in the design of electrical installations in buildings. Salaries within scales £1,140-£1,310 and £1,310-£1,480 a year.

Applications to be sent, together with particulars of qualifications, experience and salary expected, to the County Architect, Springfield, Maidstone. 916

# DRAUGHTSMEN

## for Steelworks Developments

### MECHANICAL DRAUGHTSMEN

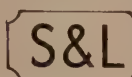
### ELECTRICAL DRAUGHTSMEN

are required to work on large development schemes which are now being planned at our Iron and Steel works at Corby, Northants. Candidates must have a minimum qualification of O.N.C. and good Drawing Office experience. Preference will be given to candidates of experience of heavy industry and particularly the Iron and Steel Industry.

Corby is situated in pleasant Northamptonshire countryside and is a New Town where the housing position is favourable.

There is a Staff Pension Fund and Group Life Assurance Scheme.

Please apply, giving full particulars of age, qualifications and salary required to:



Manager/Personnel,

**STEWARTS AND LLOYDS, LIMITED,**

Corby, Northants.

992

## ADMINISTRATIVE COUNTY OF LEICESTER

**ASSISTANT ELECTRICAL ENGINEER,**  
£960-£1,310. Candidates must be Associate Members of the Institution of Electrical Engineers or be in possession of the Higher National Certificate and be experienced in the design of electrical installations for all types of buildings.

Removal expenses and lodging allowance may be paid to a married man.

Apply on form available from the County Architect, 123, London Road, Leicester. 174

## CONSULTING ENGINEERS

require the services of

## ELECTRICAL CONTRACT ENGINEERS

with experience of overhead line and substation work up to 132 kV. Corporate Members of I.E.E. preferred, but minimum qualification of H.N.C. associated with good experience will be considered.

Salary in accordance with qualifications and experience. Bonus and pension schemes.

Applications, giving full details of age, qualifications and experience to be made in writing within fourteen days to:—

**PREECE, CARDEW & RIDER**

8-12, Queen Anne's Gate

Westminster, London, S.W.1

956

# LOEWY

require

## SENIOR ELECTRICAL DRAUGHTSMAN

with experience in electrical layouts, cabling and automatic control gear. First-class working conditions, five-day week, pension scheme, canteen. New bungalows available to rent.

Good salaries commensurate with qualifications and experience of applicant.

Write with full details to:—

The Secretary

**THE LOEWY ENGINEERING CO. LTD.**

Bournemouth, Hants

1005

## SOUTH WALES ELECTRICITY BOARD

APPLICATIONS are invited for the following superannuable positions:—

### Swansea and West Central Area

(a) **FIRST ASSISTANT COMMERCIAL  
ENGINEER, PORT TALBOT  
DISTRICT.**

The District covers an area of 80 square miles and serves 26,420 consumers, being varied in its character and with an important industrial component in addition to a rural and urban load.

The successful candidate will be responsible to the District Commercial Engineer for the supervision and control of parts of the District commercial organisation. Applicants should have had experience in the development of electricity supply, control of showrooms and sales staff, administration and operation of hire purchase schemes, electrical contracting and consumers' service. Candidates should possess a minimum qualification of H.N.C. (Electrical Engineering).

Salary N.J.B. Class H, Grade 5, Scale 12, £1,350/£1,500 p.a.

Applications stating age, present position, present salary, qualifications and experience should be addressed to G. R. T. Edwards, B.Sc., M.I.E.E., M.Am.I.E.E., Manager, Swansea and West Central Area, 29, Ystrad Road, Swansea Industrial Estate, Swansea, to arrive not later than 27th May, 1961.

Please quote reference 59/61/ER, endorsing envelope "First Assistant Commercial Engineer."

### West Wales Area

(b) **ASSISTANT ENGINEER,  
PEMBROKESHIRE DISTRICT  
(Tenby).**

Salary N.J.B. Class F, Grade 9, Scale 6, £890/£1,015 per annum.

(c) **COMMERCIAL ASSISTANT,  
SOUTH CARDIGANSHIRE DISTRICT  
(Lampeter).**

Salary N.J.B. Class E, Grade 9, Scale 5, £825/£940 per annum.

(d) **ASSISTANT ENGINEER,  
SOUTH CARDIGANSHIRE DISTRICT  
(Cardigan).**

Salary N.J.B. Class E, Grade 10, Scale 4, £765/£870 per annum.

Preference will be given to engineers possessing the Higher National Certificate in Electrical Engineering.

Applications stating age, present position, present salary, qualifications and experience should be addressed to E. Broughton, A.M.I.E.E., Manager, West Wales Area, South Beach Pavilion, Tenby, Pembro., to arrive not later than 27th May, 1961.

Please quote reference (b) "26/61/ER, Assistant Engineer," (c) "56/61/ER, Commercial Assistant," (d) "13/61/ER, Assistant Engineer."

R. G. WILLIAMS,

Secretary. 1011



**Situations Vacant (continued)****YORKSHIRE ELECTRICITY BOARD****No. 3 (Sheffield) Sub-Area  
SENIOR ASSISTANT ENGINEER**  
(Distribution Design).

Applicants should be Corporate Members of the Institution of Electrical Engineers or hold equivalent qualifications.

Applicants must have had considerable experience in the design of underground and overhead distribution systems operating at voltages up to 66 kV in large industrial, urban and rural areas. Experience in substation design and construction is desirable. The successful candidate will be required to take administrative control of the Sub-Area Distribution Design Section.

Salary N.J.B. Class N, Grade 4 (Scale 18), £2,050/£2,235 per annum.

Applications, together with the names of two referees, should be sent to the Manager, Yorkshire Electricity Board, No. 3 (Sheffield) Sub-Area, Commercial Street, Sheffield, 1, not later than 26th May, 1961.

**Head Office****COMMERCIAL DEPARTMENT****SENIOR ASSISTANT ENGINEER (Tariffs).**

A vacancy exists for an engineer to take charge of the Tariffs Sub-section of the Commercial Department at Head Office. Applicants should preferably possess an engineering qualification or corresponding University degree and have knowledge of the economic factors affecting electricity supply costs and prices. The post involves responsibility for all work in connection with the fixing of electricity tariffs, for the preparation of load and cost estimates and for research work related to these matters.

Salary N.J.B. Class BX, Grade 2 (transitional to Scale 17), £1,695/£2,085 per annum.

Applications, together with the names of two referees, should be sent to the Secretary, Yorkshire Electricity Board, Head Office, Wetherby Road, Scarcroft, Leeds, not later than 26th May, 1961.

1001

**Technical Assistants****Signal Department—Telephone Section**

TECHNICAL ASSISTANTS are required for the Drawing Office at Earls Court. Duties include the preparation of circuit and routing diagrams for new projects, design work in connection with installation of equipment for telephones, train describers and loudspeakers.

Applicants should have had training in telephone work and some knowledge and experience of manual and automatic telephone circuits.

Salary scale according to age (£495 at 21, £655 at 25, rising to £850). Commencing salary up to £790; additional payments for certain recognised qualifications; valuable free travel; 38-hour week; contributory superannuation scheme after probation; good prospects of promotion.

Please apply to the Staff and Welfare Officer (Ref.: 617/3)

**LONDON TRANSPORT, 55 BROADWAY, S.W.1**

976

**ELECTRICAL DEVELOPMENT  
ENGINEER**

required to initiate and carry out research and development work on resistors and heaters at company's laboratory near Redhill, Surrey. Good salary. Pension.

Apply Research Director, The Expanded Metal Co. Ltd., 16, Caxton Street, London, S.W.1.

945

**SOUTHERN ELECTRICITY BOARD**

**Commercial Assistant (Sales and Contracting)**  
Sub-Area Office of No. 2 (Newbury) Sub-Area. Salary N.J.B. Class M, Grade 10 (£1,275-£1,410 per annum). N.J.B. conditions of service.

Applicants should have a good knowledge of the utilisation of electricity and experience in the sale of appliances and electrical contracting work. The successful applicant would be required to assist with education and training of commercial staff carried out at Sub-Area office.

Applications on forms obtainable from the Sub-Area Secretary, 7, Oxford Road, Newbury, and returned to him, quoting Z.1349, not later than 22nd May, 1961.

**Assistant Engineer (Substation Maintenance)**  
Aldershot District of No. 3 (Portsmouth) Sub-Area. Salary N.J.B. Class H, Grade 11 (£890-£1,015 per annum). N.J.B. conditions of service.

The duties of the post will be to assist with the maintenance of plant and equipment at outdoor and indoor substations on both urban and rural systems and to undertake standby duties. Candidates should have had a good technical training, experience of the testing and maintenance of plant and equipment, and should possess suitable technical qualifications.

Applications on forms obtainable from the sub-Area Secretary, Lower Drayton Lane, Cosham, Portsmouth, and returned to him, quoting Z.1350, not later than 22nd May, 1961.

The successful candidates for the above appointments will be required to contribute to the Electricity Supply (Staff) Superannuation Scheme, if eligible.

994

**NORTH OF SCOTLAND  
HYDRO-ELECTRIC BOARD****South Caledonia Area****Second Assistant Engineer, Planning**

APPLICANTS for the above post should be technically qualified, and should have had good all-round experience of distribution. The duties will include the planning of major reinforcements and vetting of district proposals.

The appointment will be graded G.7/6, Scales 9/10 of the Common Salary Scale (£1,115/£1,325), depending on qualifications and experience. The Area classification will increase to "H" next year.

Applications should be submitted within fourteen days of this advertisement on forms obtainable from the Area Manager, Blackfriars, Perth.

943

**CONTRACTORS**, London, W.C.2, require senior estimator and/or designer for all kinds of high-class installations. Excellent prospects for right man in expanding established firm of prominent repute. Write in confidence, experience, age and salary required.—Box 133.

**J. & P.****TRANSFORMER DESIGN  
ENGINEER required for  
SOUTH AFRICA**

Johnson & Phillips wish to engage a senior power transformer design engineer with experience embracing units up to 88 kV rating, for their new Transformer factory situated about twelve miles from Johannesburg. For applicants who respond promptly, interviews can be arranged with the Managing Director of Johnson & Phillips South Africa (Pty) Ltd., who will be in London until 31st May.

Applications which will be treated in strict confidence should, in the first instance; be addressed to the Director and General Manager, Johnson & Phillips Ltd., Charlton, London, S.E.7.

972

**ELECTRICAL TRANSMISSION  
ENGINEERS-DESIGNERS-SURVEYORS**

ELECTRICAL, Mechanical, Civil Engineers experienced in overhead transmission lines, steel towers and wood poles, also Engineers experienced underground cable contracts, Designers, Surveyors, Profilers, Draughtsmen—vacancies for all grades. Required for head office and site work by large Scottish organisation of contractors for work in all areas of the United Kingdom.

This is an opportunity to join an expanding and progressive company with diverse activities in the electrical installation contracting field. Good prospects and superannuation.

Write giving full particulars of experience and qualifications, age, married or single, starting salary required. Give permanent address. Applications, treated strictly confidential, to—Box 879.

**NORTH WESTERN ELECTRICITY BOARD****Second Assistant District Engineer,  
South District, Cheadle**

THE duties will include the supervision of the erection and maintenance of substation switchgear, laying and jointing of cables, and switching operations on the H.V. and L.V. systems within the District as required. Applicants should have had a wide general experience on the distribution side of electricity supply and be prepared to undertake standby duties.

Corporate Membership of the Institution of Electrical Engineers will be an advantage.

Salary scale £1,115/£1,245 p.a., Grade G.7. N.J.B. conditions.

Applications on forms to be obtained from the Manager (Staff Vacancies), No. 1 Sub-Area, North Western Electricity Board, Town Hall, Manchester, and returned to him by 23rd May, 1961.

961



## SENIOR DESIGN DRAUGHTSMAN

required to take charge of drawing office in expanding company in South West Surrey specialising in the design and manufacture of low-tension switch and fuse gear.

Write giving full details to—Box 931.

**A** VACANCY exists at London Brick Company's clay block works at Warboys, Hunts, for a works maintenance electrician. Applicants must be competent to maintain A.C. generating equipment, A.C. motors from  $\frac{1}{2}$  to 50 h.p., general lighting equipment, and to carry out installation as and when required. House available near the works. Applications, in writing, should be made to Personnel Manager, London Brick Company Ltd., Stewartby, Bedford. 963

**B**. B.C. requires two engineers (British subjects only) for their planning and installation department. One post (A) (salary range £1,380-£1,780 p.a.) covers responsibility for the specification, supervision of installation and commissioning of a wide range of power equipment required for transmitter and studio premises of the Corporation, including H.V. switchgear, transformers, rectifiers and standby generating plant. The second post (B) (salary range £1,230-£1,555 p.a.) is for an engineer to undertake planning and installation work associated with power supplies to transmitter and studio premises. The plant concerned involves H.V. switchgear, transformers, rectifiers, standby diesel alternators, control circuitry and associated cabling and wiring installations. Both posts are based in London, but will cover Corporation sites throughout the country, and will provide opportunities of obtaining experience of the wide range of the B.B.C.'s engineering activities. Applicants for either post should have a University Degree or appropriate Higher National Certificate, and have served an apprenticeship with a manufacturing organisation with subsequent experience relevant to the types of plant listed. Write for application form to Engineering Recruitment Officer, quoting reference 61.E.96.E.R., A or B, British Broadcasting Corporation, Broadcasting House, London, W.1. 917

**B**ERMUDA. Experienced motor and armature rewinder. Highly paid permanent position.—Box 964.

**B** RITISH ENGINE BOILER & ELECTRICAL INSURANCE Co. Ltd., Longridge House, Manchester, 4. Electrical surveyor required. Permanent position carrying progressive salary scale £825 to £1,225 with non-contributory pension. Candidates, aged 26 to 32, with H.N.C. in Electrical Engineering or Grad. I.E.E., and with apprenticeship in manufacture or repair of electrical machinery, are invited to apply stating age, qualifications and experience. 947

**C** ABLE estimator required. State age and experience.—Wandside Cable Works Ltd., 106, Garratt Lane, Wandsworth, London, S.W.18. 861

**C** ONSULTING engineers require an experienced electrical engineer for their Tehran office. Duties in connection with electricity in industry and small public generation and distribution systems. Two year contract in first instance in interesting country and healthy climate. Age about 30. Minimum qualifications A.M.I.E.E. or equivalent. Application forms obtainable from Kennedy & Donkin, 12, Caxton Street, London, S.W.1, quoting reference RAV/SE. 1006

**C** ROMPTON PARKINSON Limited require a man experienced in the commercial and industrial applications of lighting engineering for sales in the London area. Proven sales initiative is essential and a technical qualification would be advantageous. This is a staff appointment with a contributory pension scheme. Apply to—Ref. S3V, Crompton Parkinson Limited, Crompton House, Aldwych, London, W.C.2. 1007

**E** LECTRIC lamp manufacturers in Surrey require either a young man to train for the position of filament designer or an experienced man in this field. Applications in writing stating age, experience and salary required to—Box 948.

**E** DITORIAL assistant (age approx. 25-30) required for the Proceedings of The Institution of Electrical Engineers. Engineering or science degree necessary, with some engineering experience, and the ability to sub-edit high-class technical copy. Commencing salary commensurate with age and experience. Five-day week. Staff restaurant. Apply—Secretary, I.E.E., Savoy Place, London, W.C.2. 918

**E** LECTRICAL appliance salesman required immediately by well-known national company to cover the East Midlands Electricity Board area. Due to expansion additional sales staff in other areas will shortly be required. Salary, commission, expenses and car provided; a staff pension scheme is in operation. Apply in confidence to the Sales Director, Allied Ironfounders Ltd., Electrical Appliance Division, Orchard House, 30, Orchard Street, London, W.1. 946

**E** LECTRICAL engineer required with extensive knowledge of English and European electrical standards. To work upon domestic electrical appliances for sale in United Kingdom and Continental markets, also the adaptation of American appliances to European standards. Must be prepared to stay for lengthy periods each year in United States. Write giving full details to—Personnel Officer, Ref. 207, Ronson Products Ltd., Leatherhead, Surrey. 776

**J** UNIOR draughtsman experienced in electrical work required by consulting engineers, London S.W.1 district. Post would suit applicant looking for promotion ahead and prepared to study for H.N.C. with this in view. Ring ABBey 6712. 965

**L** ABORATORY manager. Physicist (preferably under 40) required to take charge of research, development and routine work in the photometry and general laboratories of Holophane Limited. Some familiarity with techniques of measurement of light and heat is desirable. Successful applicant will be expected to maintain personal contact with clients, technical associations and manufacturers, involving some travel. Company pension scheme. Applications, which will be treated in confidence, should be made fully in writing to—The Technical Director, Holophane Limited, Elverton Street, London, S.W.1. 784

**L** ANCASHIRE DYNAMO & CRYPTO Ltd., Trafford Park, Manchester, require commercial electrical engineers with sound technical knowledge of rotating electrical machinery and associated apparatus for inside sales duties involving preparation of tenders and correspondence. Previous similar experience desirable. Salary scale £825 to £1,000 according to experience, with ample scope, good prospects and all usual social facilities. Assistance with removal expenses for suitable applicants. Detailed applications to Personnel Officer. 849

**L** EARNER draughtsman required by engineers. Previous experience not essential if applicant can show aptitude. Ring ABBey 4751 (London). 966

**M** OTOR control gear. Technical representative required for South Wales area. Age 25/35. Remuneration by salary, commission and expenses. Candidate must also be willing to represent other electrical products, viz., thermostats, oil and water heaters.—Box 949.

**N** EW Delhi paper power cable manufacturers require first-class cable design engineer, also test engineer to 33 kV. Telephone London, Waterloo 2248, for further details. 950

**R** EPRESENTATIVE or agent for London and Home Counties required by electrical space heater manufacturers. Must have live connections with electricity boards, local authorities, architects and consultants. Reply in confidence to—Box 901.

**R** EPRESENTATIVE req'd by Wandsworth Elect. Man'f. Co. Ltd. for West Midlands/S. Wales. The successful candidate, aged 25/35, will be req'd to sell to consult. eng., arch., public auth., etc. Previous selling exp. not necessary provided you are enthusiastic and have the ability to converse freely with customers. This excellent position carries a high basic salary, bonus, company car, pension scheme, etc. Apply in confidence, quoting ref. "AXE," to Sales Selection Ltd., Victoria House, London, W.C.1. 951

**S** ALES clerk with previous electrical experience to deal with telephone enquiries and correspondence required for the London office of Revo Electric Co. Ltd. Good salary according to age and experience. Apply Regional Manager, 30/31, Great Queen Street, London, W.C.2. 967

**S** ALES office assistant required by expanding company handling industrial heating, switchgear, street lighting. Exceptional opportunity for alert man about 25/30.—Leslie Maynard Ltd., 306b, Fulham Rd., London, S.W.10. 968

**S** ALES representative for Midlands area required by manufacturers of electric light fittings. Splendid opportunity for a man with experience and drive to develop area. Applicants should reside in area, possess own car, and age should not exceed 35. Write full particulars of experience, etc., to—Box 865.

**S** ENIOR and junior electrical design engineers/draughtsmen required for consulting engineers' office. 5-day week, luncheon vouchers, Spring and Summer holidays. Applicants for senior positions must be experienced in design of electrical services for modern hospitals, universities, factories, etc. Please apply stating age, experience and salary required to—J. Stinton Jones & Partners, 21, Gloucester Place, London, W.1. 142

**S** IEMENS-SCHUCKERT (Great Britain) Ltd., Great West Road, Brentford, Middx., have a vacancy in their switchgear sales department for an assistant electrical engineer. Applicants should have had good engineering training and be able to deal with enquiries and orders for electrical control gear and associated equipment. A knowledge of German is an advantage but not essential. Pension and bonus schemes in operation. Write fully, Marked "Confidential," to Sales Manager, "V" Department. 812

## SITUATIONS WANTED

**A** DMINISTRATIVE executive, over 20 years in electric lamp industry, seeks change with progressive company. Full particulars of experience in varying capacities on application. Please write—Box 8254.

**E** LECTRICAL engineer (O.N.C.), experience as estimating, supervising and design engineer in electrical installations, seeks new position, preferably overseas.—Box 8237.

**E** LECTRICAL engineer (26), Eng. Dip., H.N.C., returning from Canada in June, formerly with international consultants, seeks similar position, Midlands preferred. Experienced in plant design for industrial, oil refinery, chemical, mining or beneficiation and commercial projects.—Box 8249.

**E** LECTRICAL fitter seeks job erecting, installing electrically driven machines, switchgear, etc. Fully experienced electrician. Work on own initiative. Reliable.—Box 8238.

**E** LECTRICAL fitter (37), accustomed sole charge of installation and maintenance of electrical and mechanical equipment of quarries, and with general contracting experience, seeks permanent situation.—Box 8253.

**E** NGINEER, electrical, age 35, who is not afraid of work, returns U.K. May-June and seeks progressive remunerative appointment, home or overseas. Experienced in most aspects of a supply company as well as contracting and maintenance.—Box 337.

**S** ALES manager (35) seeks change. Experienced in most aspects concerning technical sales and administration; 18 years electrical engineering, mostly instruments. Reply—Box 8242.

**S** EN./sup. (36), exp. all aspects installation and maint. oilfield, refineries in Far East. A.C.-D.C. flameproof, etc. Ex Nigeria, Liberia. Mobile for overseas. Africa or M.E. Member A.S.E.E.—Box 8250.

## ARTICLES FOR SALE

W. R. SYKES INTERLOCKING  
SIGNAL CO. LTD.

**1** Type S.8/4 Westminster Coil Winder, capacity 4 coils 26-46 s.w.g., from 41" reels, with two predetermining rev. counters. 400/440-v., 3-phase motor.

**1** Type HBD/L.3 Westminster Coil Winder, capacity 3 coils 16-46 s.w.g. from 6" reels and one from 13" dia. reel. One predetermining rev. counter. 400/440-v., 3-phase motor.

Both machines in good condition. Inspection by appointment at Sykes, 26, Voltaire Road, London, S.W.4 (MAC. 3451).

1009

## HOUSE SERVICE METERS

**200** -240-v. A.C. or D.C., 10 amps. capacity, quarterly type, from 25s. each, plus 2s. 6d. carr.

UNIVERSAL ELECTRICAL CO.  
221, City Road, London, E.C.1

37

CLASSIFIED ADVERTISEMENTS  
ARE PREPAID



## Articles for Sale (continued)

**600****COMMUTATOR MOTORS****400/440/3/50**

H.P.	Speed.	Maker.	Remarks.
270/67.5	370/95	B.T.H.	Pilot motor Schrage
55/14	870/220	B.T.H.	Pilot motor Schrage
40/20	1000/500	B.T.H.	Pilot motor Schrage
40/13.3	1080/360	B.T.H.	Pilot motor Schrage
40/20	90/45	B.T.H.	Geared
5/1.67	1980/668	MET.- VICK.	Induction Regulator
3/3	3000/300	L.S.E.	Induction Regulator

**GEARED MOTORS****400/440/3/50**

H.P.	Speed.	Maker.	Remarks.
400	30	E.E.C.	Rolling mill drive
100	225	LUTH & ROSEN	Slipping
100	200	LUTH & ROSEN	Slipping
5½	200	L.D.C.	Unused slipping

Selection only; Commutator Motors, 400-cycle Alternators and other electrical equipment available for prompt delivery.

**GEORGE COHEN  
SONS & CO. LTD.**

Wood Lane, London, W.12  
(Shepherds Bush 2070)  
Stanningley, Nr. Leeds  
(Pudsey 2241)

919

**MOTORS**

**NEW CROMPTON PARKINSON,**  
from ½ h.p. to 80 h.p.; also 6,000  
A.C. and D.C. reconditioned Motors  
and Starters.

IN STOCK HERE

**B. E. WHITE**

Brantwood Rd., Tottenham, London, N.17  
Tel. EDMonton 4621-2 215

**A.A. ELECTRICAL Co.** for A.C.-D.C. motors, switchgear, exhaust fans, hoists, reduction gears, new or reconditioned units.—**CHI.** 5105. 67, Rothschild Rd. London W.4. 57  
**A. BABCOCK & Wilcox** water tube boiler will cut down your fuel costs; we can supply from stock. Two 40,000 lb. evap., 220 lb. w.p.; one 25,000 lb. evap., 200 lb. w.p.; 3,000 lb. evap., 400 lb. w.p.; Spencer Bonecourt boiler; also Marine, Cornish, vertical, etc.—Burford, Taylor & Co. Ltd., Boiler Specialists, Burtayco House, Church Street, Middlesbrough (Tel. Middlesbrough 2622). 122

**A.C. and D.C. motors, generators, from stock.**—Service Electric Co. Ltd., Honeypot Lane, Stanmore, Middx. (Edgware 5566/9). 91  
**A.C. and D.C. 1/- slotmeters.** Guaranteed 2 years, 2½-50 amps. From 55/-. Repairs and recalibrations. See Billiard: Tradex Meter Co., Surbiton (Tel. Elmbridge 2234/5/6). 169

**ALTERNATORS, 3-phase, all sizes in stock from 7 kVA up to 330 kVA.**—Britannia Manufacturing Co. Ltd., 22/26, Britannia Walk, London, N.1 (CLERKENWELL 5512). 24

**ALTERNATORS for sale from 1,000 kVA at 750r.p.m. down to ½ kVA.** Single and three-phase. All voltages. More than 150 machines in stock. Automatic regulators and switchboards available.—Fyfe, Wilson & Co. Ltd., Station Works, Bishop's Stortford. 162

**ALTERNATORS and generators, all types up to 150 kW.**—Powerco Ltd., 312, York Road, London, S.W.18 (VAN. 5234). 151

**BARGAINS in electric motors from A. Cooksley & Co. Ltd., 21/25, Tabernacle Street, London, E.C.2. Ring Monarch 3355. 50**

**CONVERTERS, motor-alternators, motor-generators, frequency changers, etc.** All types up to 100 kW.—Powerco Ltd., 312, York Rd., London, S.W.18 (VAN. 5234). 150

**BILLIARD meters.** 1/-, 6d. or rd. slot. All time settings. From 170/-. See Quarterly.—Tradex, Surbiton. 170

**CABLE, underground, PILC/VIR/LC, ex London stock.** Cutting orders same day delivery London area. Send for priced stock lists.—Batt Electrical Co., 6, Dock Street, London, E.1 (Tel. ROYal 5905). 316

**CIRCUIT-breakers, various sizes in stock, A.C. and D.C., 200 amperes up to 2,000 amperes.** Also dynamo and alternator switchboards.—Britannia Manufacturing Co. Ltd., 22/26, Britannia Walk, London, N.1. 26

**CRANE motors.** Direct current, series wound or compound wound, all voltages. We have large stocks.—Britannia Manufacturing Co. Ltd., 22/26, Britannia Walk, London, N.1. 22

**DIESEL generating sets, all sizes to 500 kW.** Britannia Mfg. Co. Ltd., Britannia Walk, London, N.1. 16

**ELECTRIC motors, dynamos, alternators and motor generator sets of all sizes.** We hold one of the largest stocks in England. New and reconditioned, with 12 months' guarantee.—Britannia Manufacturing Co. Ltd., Britannia Walk, London, N.1 (Clerkenwell 5512, 3 lines); also Works and Stores, Chobham, Surrey. 20

**ELECTRIC motors, generators, motor generator sets, transformers, switchgear, etc., large comprehensive stock, overhauled and guaranteed.** Copy of our Register, "Electrical Surplus," containing thousands of items of electrical plant, sent on request.—R. F. Winder Ltd., Belgrave Electrical Works, Leeds, 2. 54

**FLUORESCENT fittings, shells and chokes to BS 2818 (Licence No. 3237), coil winding, all sheet metal work.**—D. E. Cowling & Sons Ltd., Romside Trading Estate, North St., Romford 47282. 60

**FLUORESCENT tubes reconditioned and guaranteed with a life as new from 7s. 6d. each.** Free collection and delivery in Lancs and Yorks. Save 40% on your tube replacement costs by using this service. We are also manufacturers of top quality fluorescent fittings, trunking systems, control gear and new fluorescent tubes. Generous discounts available.—Anglo-American Electrical Company, Clive Street, Bury (Telephone, Bolton 27251). 212

**FOR sale, "Electrical Review," vols. 140-154 (1947-54).**—Nettle Accessories Ltd., Harper Road, Wythenshawe, Manchester, 22. 932

**FOR sale, good unused and used machinery including electric motors, A.C. and D.C. dynamos, alternators, transformers, diesel and steam electric generating sets, mains failure sets, motor generator and Ward Leonard sets, switchgear, compressors, fans, capacitors, etc.**—Fyfe, Wilson & Co. Ltd., Station Works, Bishop's Stortford, Herts (Tel. B.S. 1000/1). 161

**FOR sale, two Bastian & Allen type 90 electrode boilers, serial numbers C.2497/8, manufactured in 1950, each rated at 550 kW per hour with 415-volt, three-phase, 50-cycle A.C.; complete with isolators and automatic control panels. Dimension 3' diameter x 8' 9" overall height. The equipment, which will become available June/July, 1961, can be seen in operation by arrangement during May, 1961. Apply—The Buildings Officer, St. Salvador's College, College Gate, St. Andrews. 933**

**GEARED motorised units.** If the call is urgent within the fractional range, phone CLE. 4141.—Jeary Electrical, 132, East Road, London, N.1. 127

**GENERATING sets, portable or stationary, new and reconditioned, 1 to 100 kW, A.C. and D.C.**—Powerco Ltd., 312, York Road, London, S.W.18 (VAN. 5234). 148

**INSULATING varnish, clear, Minerva No. 720, £10 per 40-gal. drum.**—Lowton Metals Ltd., Sandy Lane, Lowton St. Mary's, Leigh, Lancs. (Tel. 71441/2). 93

**KARDEX, Roneodex and Shannovue cabinets, as new.**—F. H. Jolly & Co. Ltd., 289, King St., London, W.6 (RIV. 5381). 202

**MOTOR generator sets and converters, all sizes and voltages from ½ kW up to 500 kW in stock.**—Britannia Manufacturing Co. Ltd., 22-26, Britannia Walk, City Road, London, N.1 (Tel. Clerkenwell 5512, 5513 & 5514). 12

**MOTORS and control gear, huge stocks all types, ½ to 200 h.p.**—Ramsbottom & Co. Ltd., Elec. Engineers, Keighley (5444/7). 70

**NAMEPLATES, engraving, diesinking, stencils.**—Stilwell & Sons Ltd., 153, Far Gosford Street, Coventry. 108

**PEAK load supervisory equipment manufactured by Chamberlain & Hookham for sale.** Contact Assistant Manager, Kensington Close Hotel (London) (WESTERN 8170). 969

**PHASE converters, single to three-phase, several sizes in stock up to 90 h.p., 3-phase loading.**—Britannia Mfg. Co. Ltd., Britannia Walk, London, N.1. 29

**PLATING dynamos and motor generator sets, various sizes from 500 amps. up to 2,000 amps., with A.C. and D.C. motors.**—Britannia Manufacturing Co. Ltd., 22/26, Britannia Walk, London, N.1. 15

**POLYPHASE kilowatt hour meters.** Available from stock.—Universal Electrical, 221, City Road, London, E.C.1. 40

**PREPAYMENT rs. slot house service meters.**—Universal Electrical, 217-221, City Road, London, E.C.1. 36

**PURLEY chokes and ballasts.** Our 80-w. tapped h.p.f. ballast with starter switch-holder incorporated is proving itself the most popular unit. Suitable for most fittings, 57s. 6d. each subject.—F. W. Blanshard Ltd. (Dept. ER), Purley, Surrey (Uplands 4818/9). 52

**QUARTERLY credit meters, single and polyphase, 2½-100 amps.** From 20/-. Also D.C. See Television.—Tradex, Surbiton. 171

**ROTARY converters in stock, all sizes; enquiries invited.**—Universal Electrical, 221, City Road, London, E.C.1. 34

**SECONDHAND Sturtevant Multivane fans, S two only, No. 5 MV/design 4, electrically driven, full casing, single inlet, complete with overhung grooved pulleys.** Also two only 3-h.p., 3-phase motors to suit, screen protected squirrel cages; wound for 1,440 r.p.m. Best offer. (Space required). Apply Blacknest Farm, Dunsfold, nr. Godalming, Surrey. 952

**SMALL BR screws and nuts in steel, brass and stainless steel, from stock.**—Premier Screw & Repetition Co. Ltd., Woodgate, Leicester. 180

**TELEVISION slotmeters and time switches.** Details from: Tradex Meter Co., Surbiton (Elmbridge 2234/5/6). 172

**VENNER time switches, 200-240 v. A.C./D.C., 10-50 amps., from stock.**—Universal Electrical Co., 221, City Rd., London, E.C.1. 38

**WARD Leonard motor generating sets, all sizes.**—Britannia Manufacturing Co. Ltd., 22-26, Britannia Walk, London, N.1 (Tel. Clerkenwell 5512). 10

**50 5/16" Inconel elements, 54", 1,300 watts, 2 Simplifix nipples.** Never used.—Laundry Supply Company, 169, Stobcross St., Glasgow, C.3. 855

**400-cycle to 1,500-cycle motor alternators and alternators.**—Britannia Mfg. Co. Ltd., Britannia Walk, London, N.1. 27

**500-kW, 220-volt Met-Vick rotary converter, with transformer, 11,000 volts, 3-phase, 50 cycles, and accessories.**—Britannia Mfg. Co. Ltd., Britannia Walk, London, N.1. 17

**EQUIPMENT FOR HIRE**

**GENERATING set hire service.** Consult the most experienced firm for A.C. and D.C. units from 2 kW to 240 kW, diesel or petrol, stationary or mobile, sale or hire, 24-hr. breakdown service.—Dawson-Keith Ltd., Hillview Rd., Sutton, Surrey (Fairlands 4401). 46

**ARTICLES WANTED****WANTED**

D.C./A.C. Motors, Transformers, Cables and all redundant Power Station plant wanted for dismantling.

ASK US TO QUOTE

**B. M. T. CO. LTD.**  
London Road, Barking  
(RIP. 3387/3715)

298

**WANTED FOR CASH**

**SURPLUS Diesel Generating Sets, all sizes up to 1,000 kW.** We dismantle and remove.

**DAWSON-KEITH LTD.**  
Hillview Road, Sutton  
(Fairlands 4401/2/3)

47

**BALL and roller bearings, etc., wanted.** Also surplus goods, especially hand tools, of all descriptions. For sale: Metal ammo boxes in varying sizes, ideal for storage, despatch, etc.—R. Pordes, 138, New Cavendish Street, London, W.1 (MUSEum 5250). 904



## EDUCATIONAL

## SOUTH EAST LONDON TECHNICAL COLLEGE

Lewisham Way, London, S.E.4 (Telephone: TIDeway 1421-3)

SIX MONTHS FULL-TIME COURSE  
(16th October 1961 to May 1962) for

### INSTITUTION OF ELECTRICAL ENGINEERS

**PART III EXAMINATIONS** (including Engineering Physics if required)  
London Fee £17

ENGINEERING SANDWICH COURSE  
(Four Years) for

### INSTITUTION OF ELECTRICAL ENGINEERS

**PARTS I and II EXAMINATIONS**

London Fee £12.10.0 per year

### TELECOMMUNICATION TECHNICIANS

TWO-YEAR SANDWICH COURSE  
London Fee £17 per year

APPLICATIONS to attend any of these courses should be sent to the Head of the Electrical Engineering and Applied Physics Department as soon as possible and not later than 1st September 1961. Please quote (GP2/R/1182/5). 920

**A**.C./D.C. electric motors, generators, transformers, disused stocks of cable, power houses bought and dismantled.—Samuel Hyams, 129, Lams Lane, Rainham, Essex (Rainham 4896). 125

**T**EST transformer required, suitable for 150 kV, 1 to 5-kVA capacity. Supply for 240 or 440 volts.—J. R. Ferguson (Elec. Eng.) Ltd., Tameside Works, Park Road, Dukinfield, Cheshire. 8251

**T**RICHLORETHYLENE degreaser required. Approximate size 3' x 3' x 3' high. Gas heated. Manufactured by I.C.I. Ltd., or equivalent.—J. R. Ferguson (Elec. Eng.) Ltd., Tameside Works, Dukinfield, Cheshire. 8252

**W**ANTED, D.C. and A.C. ball-bearing motors, motor generator sets, dynamos and alternators. Full details to—Britannia Manufacturing Co. Ltd., 22-26, Britannia Walk, London, N.1. 13

**W**ANTED for prompt cash, ferrous and non-ferrous scrap, also plant for dismantling. Buyers of secondhand machinery and plant for re-use.—W. & H. Cooper Ltd., 176, Brady St., Bethnal Green, London, E.1. 120

**W**ANTED, rotary converters, any sizes.—Universal, 221 City Rd., London E.C.1. 35

**W**ANTED, surplus stock cable, all types and sizes. We can inspect.—Box 220.

**W**ANTED, 3-phase transformer, input 346-400 v., 230 v., output 6½-12½ kVA, 50 cyc.—Towse, 274, Promenade, Blackpool. 8235

#### BUSINESS OPPORTUNITIES

**E**LEC. wholesalers West London/Middlesex, having surplus space, will stock and distribute for manufacturer to other wholesalers, etc., in London area. Some representation might be arranged.—Box 847.

**M**ANUFACTURERS of electrical machines and control gear would like to contact a small firm of electronic engineers with a view to purchase.—Box 798.

#### WORK WANTED AND OFFERED

**A**.C. and D.C. motor rewinds and repairs. Prompt service, fully guaranteed.—Edgware 5566/9; Service Electric Co. Ltd., Honey-pot Lane, Stanmore, Middx. 92

**A** VAILABLE capacity for winding fractional to 200-h.p. motors. Also machining and assembly of electrical components. Leading manufacturers please note. Skilled operatives, small overheads, enable keen prices, by contract or otherwise. Rewinds and repairs.—S. W. Fletcher (Electric Motors) Ltd., 33, Elenora Street, Stoke-on-Trent (Tel. 44551). 48

**M**ETALWORK. All types cabinets, chassis, racks, etc., to your own specifications. Write—Dept. 'S', Philpott's Metal Works Ltd., Chapman Street, Loughborough. 211

**P**RODUCTION winding of armatures, stator, coils, transformers. Also special motors. Prompt and reliable deliveries.—Lewis Electric Motors Ltd., Moor Wks., Maidenhead, Berks. 194

#### AGENCIES

#### AGENT FOR THE UNITED KINGDOM REQUIRED

**L**EADING firm in Western Germany manufacturing ceramic insulators for overhead lines and electrical apparatus requires live representative for Great Britain with established connection among British firms and manufacturers of electrical apparatus for high and low tension use.

Interested firms or persons with extensive knowledge in this field should send their application giving full particulars to—Box 934.

**A**GENCY urgently required for conduit manufacturers in U.K. for export to New Zealand and Australia.—Box 8255.

**C**OMPANY manufacturing industrial electrical equipment requires agents on a commission basis for Bristol and South Wales. Connection with electrical wholesalers and contractors essential. State area covered.—Box 935.

**S**COTTISH agent with first-class connection leading wholesalers, etc., wishes represent electric blanket makers.—Box 8248.

#### U.K.A.E.A.

#### HARWELL REACTOR SCHOOL

Control and Instrumentation of Reactors  
Course No. 7

**T**O be held at Durdley Hall, Bourne-mouth, from 25th September to 6th October, 1961, inclusive. Fee £52 10s. exclusive of accommodation. It is intended for those who have a direct interest in the control and instrumentation of nuclear reactors, and participants are assumed to have some knowledge of the basic principles of these subjects.

Application forms and further details for this course can be obtained from:—

The Manager, Reactor School  
A.E.R.E., HARWELL  
Berks

1010

#### BATTERSEA COLLEGE OF TECHNOLOGY, LONDON, S.W.11

**T**HE fifth One-Year Full-Time Course in CONTROL ENGINEERING will commence on 2nd October, 1961. The course is recognised by the D.S.I.R. for the tenure of Advanced Course Studentships and holders of a second class Honours Degree may qualify for the award of a Studentship.

Applications should be submitted to the Head of the Electrical Engineering Department, Battersea College of Technology, Battersea Park Road, London, S.W.11. 970

**C**ITY and Guilds (Electrical, etc.), on "No pass—No fee" terms. Over 95% successes. For details of modern courses in all branches of electrical engineering, applied electronics, automation, etc., send for our 148-page handbook—free and post free.—B.I.E.T. (Dept. 12a), 29, Wright's Lane, London, W.8. 100

CLASSIFIED ADVERTISEMENTS  
ARE PREPAID

#### COMPANY MEETINGS

### THE TELEGRAPH CONDENSER COMPANY

RECORD LEVEL OF EXPORT TRADE

CREDIT RESTRICTIONS AFFECT DOMESTIC APPLIANCE DIVISIONS

MR. W. C. HANDLEY ON THE CURRENT OUTLOOK

**T**HE 28th Annual General Meeting of The Telegraph Condenser Company Limited was held on 3rd May at the offices of the company, Wales Farm Road, North Acton, London, W.3, Mr. W. C. Handley, B.Sc.(Tech.), M.I.E.E. (the chairman), presiding.

The following is his circulated statement:—

At the Board Meeting following last year's Annual General Meeting, Mr. D. W. Aldridge resigned as Chairman of your Company, and my colleagues elected me in his place. You will wish to join the Board in extending to Mr. Aldridge our thanks for the valuable service he has rendered to the Company over many years.

Dr. L. G. Brazier and Mr. R. C. Sprague were elected to the Board during the year. Dr. Brazier brings wide experience in the field of research in the electrical industry; and Mr. Sprague is Chairman of Sprague Electric Company, the largest manufacturers of fixed electrical condensers in the world. I will make further reference to Sprague Electric Company in this Statement.

#### Accounts

The trading profit for the year ended 31st December, 1960, amounted to £701,737, or £68,942 less than for the previous year. You will recall that in his Statement last year Mr. Aldridge stated that any further tightening of Government monetary policy could cause a setback to our further expansion, and consequent upon the sudden re-imposition of hire purchase and credit controls in the second half of the year, it was inevitable that the demand for our products used in television and domestic appliance applications should fall substantially. Had it not been for improved results from other Divisions, trading profits would have been materially lower.

Your Board recommend a final dividend of 12½% and a cash bonus of 5%, making, with the 5% interim dividend already paid, a total distribution of 22½% for the year. A transfer of £150,000 to General Reserve is also recommended, leaving Group Carry Forward £14,275 higher at £195,265.

(Continued at foot of page 122)



AC-Delco Division of General Motors Ltd. ....	72	Fafnir Bearing Co. Ltd. ....	42	Pirelli-General Cable Works Ltd. 60 & 61	60	Stockfield Mfg. Co. Ltd. ....	28
Aberdare Cables Ltd. ....	39	Ferranti Ltd. ....	53	Portable Furnace & Patents Co. ....	74	Stone, J., & Co. (Deptford) Ltd. ...	16
Aerialite Ltd. ....	93	Fractional H.P. Motors Ltd. ....	74	Precision Screw & Mfg. Co. Ltd. ...	90	Sutcliffe Speakman & Co. Ltd. ....	34
Allen, W. H., Sons & Co. Ltd. ....	22	Fuller Electric Ltd. ....	15				
Amber Oils Ltd. ....	70	G.W.B. Furnaces Ltd. ....	9	Rawlings Mfg. Co. Ltd. ....	95	Taylor, Austin, Electrical Ltd. ....	28
Anglo-American Vulcanized Fibre Co. Ltd. ....	3	Geipel, Wm., Ltd. ....	82	Rawplug Co. Ltd. ....	23	Techna (Sales) Ltd. ....	30
Arcoelectric Switches Ltd. ....	100	Gestelith Division of Gestetner		Reynolds, A., & Co. Ltd. ....	2	Teico Ltd. ....	105
Asquith Electrics (Colne) Ltd. ....	97	Duplicators (B.S.O.) Ltd. ....	25	Robinson, F. C., & Partners Ltd. ...	33	Telegraph Condenser Co. Ltd.	
Associated Electrical Industries Ltd.		General Electric Co. Ltd. ....	57, 79 & 91	Robinson, Lionel, & Co. Ltd. ....	27	(Company Meeting) ....	121 & 122
		Guide to Electrical Contractors,		Rowlands Electrical Accessories Ltd.	50	Thompson Bros. (Engineers) Ltd. ...	88
		Regional ....	103, 104 & 105	Ruberoid Co. Ltd. ....	50	Transformer & Electrical Co. Ltd. ...	88
Atlas Lighting Ltd. ....	35			Runbaken Electrical Products ....	105	Trist, Ronald, & Co. Ltd. ....	17
						Turnock, Geo., Ltd. ....	88
Backer Electric Co. Ltd. ....	86	Hackbridge & Hewitt Electric Co.		Sanders, W., & Co. (Wednesbury)		Universal Electrical Co. ....	122
Belmos Co. Ltd. ....	Cover 1	Ltd. ....	32	Ltd. ....	4	Utilities (London) Ltd. ....	78
Berry's Electric Magical Ltd. ....	67	Harvey Hubbell Ltd. ....	82	Santon Ltd. ....	94		
Beryllium & Copper Alloys Ltd. ....	86	Heatrae Ltd. ....	1	Sax, Julius, & Co. Ltd. ....	74	V.G. Porcelain Co. Ltd. ....	74
Boby, W., Ltd. ....	84	Heaven, Dowsett & Co. Ltd. ....	95	Scholes, George H., & Co. Ltd. ....	20	Venesta Foils Ltd. ....	68
Braby, F., & Co. Ltd. ....	7	Hirst Electronic Ltd. ....	98	Silver City Airways Ltd. ....	96	Vent-Axia Ltd. ....	63
Bray, E. N., Ltd. ....	49	Howells (Electric Motors) Ltd. ....	99	Simmons Electrical & Winding Co.			
Brentford Transformers Ltd. ....	77			Ltd. ....	88	Wade, Geo., & Sons Ltd. ....	31
British Central Electrical Co. Ltd. ....	71	I.A.C. Ltd. ....	30	Simon-Carves Ltd. ....	92	Wades (Halifax) Ltd. ....	38
British Driver-Harris Co. Ltd. ....	43	Injection Moulders Ltd. ....	101	Simplex Electric Co. Ltd. ....	44 & 45	Wandless Cable Works Ltd. ....	75
British Insulated Callender's Cables Ltd. ....	87	Insuloid Mfg. Co. Ltd. ....	70	Skefko Ball Bearing Co. Ltd. ....	19	Weir Electrical Instrument Co. Ltd.	34
		International Combustion Products		Smith, Frederick & Co. ....	56	Wellings, Male & Co. Ltd. ....	12
		Ltd. ....	85	South Wales Switchgear Ltd. ....	40	Wirax Wirewares Ltd. ....	95
Brush Electrical Eng. Co. Ltd. ....	13			Standard Telephones & Cables Ltd.	69	Wootton & Co. Ltd. ....	21
Bull, John, Rubber Co. Ltd. ....	Cover 3	Johnson, Matthey & Co. Ltd. ....	36	Statter, J. G., & Co. Ltd. ....	58		
Bulphitt & Sons Ltd. ....	14			Stewart Transformers Ltd. ....	90	Yarrow & Co. Ltd. ....	21
Burnard, W. E., & Son Ltd. ....	84	Litholite Insulators & St. Albans					
Burt, Boulton & Haywood Ltd. ....	76	Mouldings Ltd. ....	97				
		Llandaff Engineering Co. ....	38				
Cableflow Ltd. ....	96	Low Moor Alloy Steelworks Ltd. ....	89				
Cashmore John Ltd. ....	18						
Cast Basalt Products Ltd. ....	52	M.C.B. Co. (Manchester) Ltd. ....	98				
Central Electricity Generating Board	102	M.E.I. Co. Ltd. ....	83				
Cohen, George, Sons & Co. Ltd. ....	98	M.T.E. Control Gear Ltd. ....	27 & 62				
Contractors, Electrical, Regional		Maclaren, Robert, & Co. Ltd. ....	46				
Guide to ....	103, 104 & 105	Magnetic Devices Ltd. ....	37				
Craig & Derricott Ltd. ....	47	Martindale Electric Co. Ltd. ....	101				
Crompton Parkinson Ltd. ....	78 & 106	Mek-Elek Engineering Ltd. ....	122				
Curtis Mfg. Co. Ltd. ....	97	Metway Electrical Industries Ltd.					
			73 & 98				
Dacier Ltd. ....	38	Micanite & Insulators Co. Ltd. ....	66				
Daly (Condensers) Ltd. ....	12	Midland Dynamo Co. Ltd. ....	16				
Datum Metal Products Ltd. ....	10	Midland Electric Mfg. Co. Ltd. ....	Cover 4				
Dennis, G. P., Ltd. ....	29	Minnesota Mining & Mfg. Co. Ltd. ....	65				
Donovan Electrical Co. Ltd. ....	122	Mullard Ltd. ....	41				
E.D.L. Industries Ltd. ....	97	Nettlefold & Moser Ltd. ....	54				
Ekontrol Ltd. ....	24	New Switchgear Construction Co.					
Electro Methods Ltd. ....	11	Ltd. ....	90				
Ellison, Geo., Ltd. ....	48	Newton Bros. (Derby) Ltd. ....	76				
Eltron (London) Ltd. ....	82	Non-Ferrous Die Casting Co. Ltd. ...	26				
Engel & Gibbs Ltd. ....	33						
English Electric Co. Ltd. ....	Cover 2	Ormond Engineering Co. Ltd. ....	5				
Evans, F. W., Ltd. ....	12						
Everett Edgumbe & Co. Ltd. ....	59	Pan American World Airways ....	8				
Exocell Metal Workers Ltd. ....	30	Paxtons (Electrical) Ltd. ....	30				
Expert Industrial Controls Ltd. ....	51	Permanoid Ltd. ....	64				

## MEKELITE

GEARED JOINT



INDUSTRIAL  
LIGHTING  
UNITS

For wall, bench or machine mounting. Catalogue sent free on request.

**MEK-ELEK Engineering Ltd.,** MITcham  
17, Western Road, Mitcham, Surrey. 3072

## HOUSE SERVICE METERS



Credit Pattern  
and Prepayment Type  
200-240 v. A.C. S/Ph 50c. (8 & D.C.)  
AVAILABLE FROM STOCK  
POLYPHASE 400-440 v. 3-wire Type  
Ex Stock

**UNIVERSAL ELECTRICAL CO.**  
217-221 City Road, London, E.C.1

## DONOVAN

ELECTRICAL WHOLESALERS

For MOST INDUSTRIAL  
and DOMESTIC ELECTRICAL  
SUPPLIES



**THE DONOVAN ELECTRICAL CO. LTD.**  
(WHOLESALE DIVISION)  
75-82 GRANVILLE STREET, BIRMINGHAM 1  
DAY & NIGHT Tel. No.: MIDland 9441 (13 lines)

### Company Meeting (continued)

#### General Comments

Notwithstanding the severe reduction in demand for our products in the entertainment industry during the latter months of 1960, we were fortunate in being able to continue to trade at a reasonable level of profit due to an increasing demand for our industrial products and to a record year of overseas trading.

Arrangements which were put in hand to increase our output of industrial condensers are now beginning to show encouraging results; and it is hoped to erect a substantial extension to our Scottish factory during the year to provide further additional space for their manufacture.

Our export trade reached an all-time record during 1960; many additional contacts were made and the resulting order book showed the efforts of our sales personnel to have been well worth while. The present demand for T.C.C. condensers overseas is most encouraging.

#### Agreement with Sprague Electric Company

I am very pleased to be able to inform you that during the year your Board concluded a series of agreements with Sprague Electric Company of North Adams, Massachusetts, U.S.A., under which long-term arrangements have been made for the exchange of know-how, techniques and patents, and under which your Company has acquired exclusive agency rights for the distribution of Sprague products in Great Britain. Full details of the terms of the arrangement were circulated to shareholders last June.

This partnership will, I am confident, be increasingly beneficial to your Company in the future and will enable us to expand and improve the range of our products.

#### Outlook for 1961

As you will doubtless have read in the National Press and from statements made by the chairmen of the leading manufacturers of popular home entertainment appliances, the immediate outlook is not encouraging. I am afraid that

we must expect the demand from manufacturers in some industries to be below the 1960 level, but at the same time, maximum effort will be sustained in developing new products.

We must therefore rely more, at any rate for the present, upon demand for home applications for our industrial types and upon our overseas trade. In both these fields our order book is at a satisfactory level.

Taking these trends into consideration coupled with the steadily increasing cost of materials and labour, it does at present appear that the prospects for the current year are somewhat less favourable than those of a year ago.

#### Personnel

We are indebted to the Management, Staff and Workpeople of the Parent and Subsidiary Companies for all their hard work during a somewhat trying year. I am sure the Shareholders will wish to join me in thanking them for their efforts.

The report and accounts were adopted. 907



# JOHN BULL



## PRESCOLLAN<sup>★</sup>

### POLYURETHANE RUBBER

High tensile strength, resistance to impact, a remarkable capacity to withstand abrasion and tearing are the outstanding characteristics of Prescollan—the polyurethane rubber manufactured by John Bull for exacting and heavy-duty applications. The resistance of Prescollan to tearing and abrasion is five times better than that of the best natural rubber tyre tread stock.

Prescollan resists many oils and fuels, weathering and ozone attack and may be used in temperatures up to 100°C. Due to the very high modulus of the harder grades, it combines the advantages of rubbers and plastics.

Specialised grades of Prescollan have been developed by John Bull research chemists and we will be glad to discuss the application of them to problems which call for a resilient material with unique properties.

★ Registered Trade Mark

Prescollan components illustrated are Bellows, Diaphragm, Steering Joint Cover, Roller Section for rice mill, Buffer, Machine Tool Slideway Wipers and Silent Gears.

JOHN BULL RUBBER CO. LTD. (Mechanical Products Division) LEICESTER  
TELEPHONE: 36531







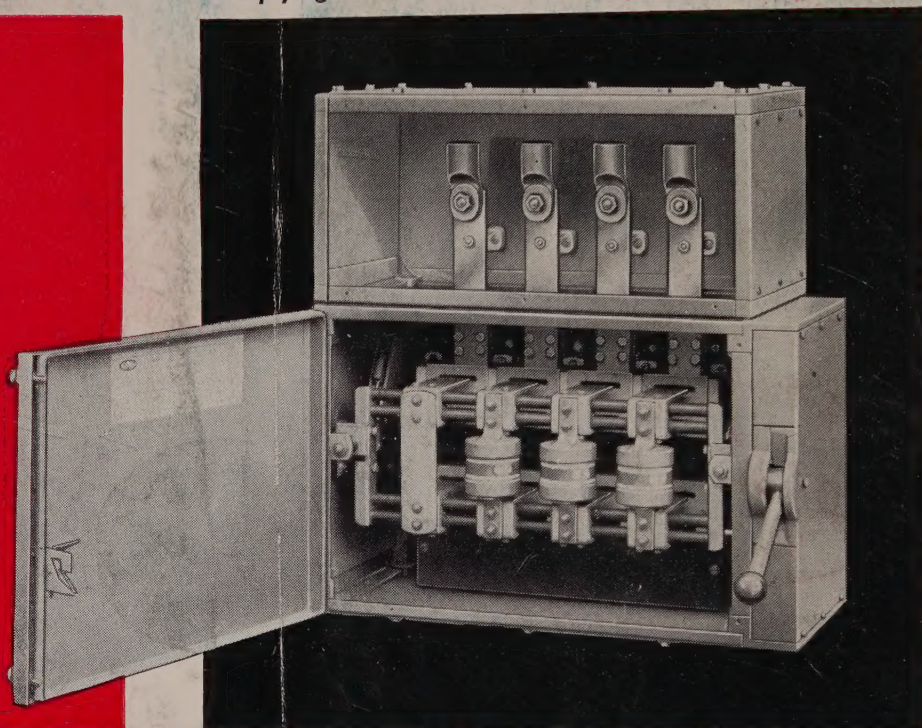
# 'GLASGOW-EXEL'

HEAVY DUTY

Composite Units of Switches and Fuses

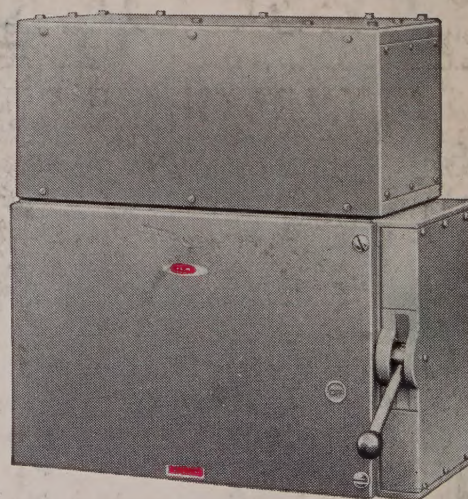
Complying with B.S.3185: 1959

**Designed  
for use on  
large industrial  
and power  
systems.  
500-600-800 Amps  
440 Volts A.C.  
T.P., T.P. & N.  
FOUR POLE  
(Three phase  
& switched  
neutral).**



When the "Glasgow-Exel" is fitted with suitable current limiting H.R.C. cartridge fuse-links, it is capable of closing on to 440 volt, 35 M.V.A., 3-phase faults. Making and Breaking Capacity Tests. B.S.3185: 1959, requires a test voltage not less than 110 per cent of rated voltage and a current not less than three times normal current rating at a power factor not greater than 0.3 lagging.

The 800 amp "Glasgow-Exel" dealt effectively with an applied test current of 2,400 amps at 485 volts with a power factor of 0.25 lagging.



Write for List No. 450 R

MIDLAND ELECTRIC MANUFACTURING CO. LTD., REDDINGS LANE, TYSELEY, BIRMINGHAM, 11